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Consumer Perception of The Use of Artificial Intelligence in Advertising along the customer journey

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Master Dissertation presented as partial requirement for obtaining the Master's degree in Data-Driven Marketing in Digital Marketing and Analytics

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CONSUMER PERCEPTION OF THE USE OF ARTIFICIAL INTELLIGENCE IN ADVERTISING ALONG THE CUSTOMER JOURNEY

by

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Master thesis presented as partial requirement for obtaining the Master's degree in Data-Driven Marketing, with a specialization in Digital Marketing and Analytics

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STATEMENT OF INTEGRITY

I hereby declare having conducted this academic work with integrity. I confirm that I have not used plagiarism or any form of undue use of information or falsification of results along the process leading to its elaboration. I further declare that I have fully acknowledge the Rules of Conduct and Code of Honor from the Nova Information Management School.

Mafalda Soares Medeiro

Lisboa, 2023

DEDICATION/ ACKNOWLEDGEMENTS

I dedicate the present dissertation to my parents, for their support and contribution to the development of my academic qualifications and for encouraging me to challenge myself every day. A special gratification to all my remaining family who have followed closely my journey until this moment.

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ABSTRACT

The Artificial Intelligence in Digital Marketing has been changing the way companies work and interact with their customers, through the collection of costumer data from different sources, providing valuable consumer insights about their needs. This research aims to analyze the perception of consumers living in Portugal regarding the use of AI in online display ads during the customers journey and in what circumstances do consumer perceptions change, for that, two experiments were conducted, a online questionnaire and a lab study relying on Neuromarketing tools. In both studies, the participants were randomly assigned to one of the experimental conditions (Assistant type: AI vs Human), showing two advertisings with the same visual appearance changing only the description in the eye-tracking case. The study results demonstrate that the use of assistant influence the participants perception of intrusiveness and privacy concerns. AI generated ads are considered less intrusive and less invasive than the human ads scenario. When exposed to ads made by robots, they show greater interest when compared to the human generated ad. The present study contribute to understand how valuable the personalized ads are to the customers, to identify the concerns with data privacy and the respective influence in the customers behavior and contribute with powerful insights to the Privacy vs Personalization Paradox.

KEYWORDS

Artificial Intelligence, Marketing Communications, Online Display Ads, Consumer Perceptions, Privacy Concerns, Privacy vs Personalization Paradox

Sustainable Development Goals (SGD):

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1. INTRODUCTION

The appearance of new technologies, particularly Artificial Intelligence (AI), has been introduced in a significant way in people's lives, unnoticed by many (Vieira & Magano, 2021). AI is defined as a computational tool capable of collect and learn from consumer data, making it possible to make real-time decisions, identify patterns and gather meaningful insights (Rodgers & Nguyen, 2022). These tools represent a great opportunity for companies to increase efficiency and knowledge about the consumers (Munyengeterwa, 2021), reduce costs, and improve interactions with them (Oliveira & Pessoa, 2021). In the study conducted by IBM, it's estimated that 35% of companies are already using artificial intelligence and 42% are exploring the technology (IBM, 2022).

According to previous research, interest in the use of AI in Digital Marketing has been increasing (Vlačić et al., 2021). AI has changed the way companies work (Verma et al., 2021) and interact with their customers throughout their journey, to meet their needs (Suman, 2022), enabling the delivery of "the right message through the right channel at the right time" (Gomes, 2022; Kumar, 2019). However, consumer perceptions of personalized advertising is unanimous, there are customers who view targeted advertising not as personalization but as an invasion of privacy.

This led to the "personalization vs invasion paradox", where consumers may value personalized content that is interesting to them and facilitates their decision-making (Cloarec, 2022; Xu et al., 2011; Zhu & Chang, 2016), which contributes to brand loyalty. On the other hand, consumers may feel watched by the collection and analysis of their personal data, highlighying the privacy concerns (Chen et al., 2022).

Previous studies suggested a research focus on the impact of AI in online advertising on the customer journey (Ahmad & Mokarram, 2021). However, little is know about the perception of personalized advertising focused on customers of different generations living in Portugal. It is important to conduct a study focused on consumers perceptions in Portugal and begin to fill this specific gap through the literature on the impact of artificial intelligence on the customer journey (Jeffs, 2017), the invasion vs personalization paradox (Antonio et al., 2022; Xu et al., 2011; Zhu & Chang, 2016) and privacy concerns (Krafft et al., 2017).

The present research aims to analyze consumers perceptions of personalized advertising along their customer journey in Portugal. The study address the following questions to better understand consumers and under what circumstances consumers perceptions change: Does advertising, particularly online display ads using AI, affect

consumer’s behavior during their journey? Do privacy concerns affect customers' perception of personalized ads ? Does the implementation of AI affect consumers' perceptions of the brand that uses these tools to communicate with customers?.

The study objective is to explore if the artificial intelligence personalized display ads affect the consumer perception and atittudes towards the brands that use AI, leading to brand dilution or, on the contrary, customers value the personalized advertising through AI. Regarding the circumstances under which opinions change, the study aims to conclude whether factors such as AI (vs Human)-enabled ads, privacy concerns, and level of intrusiveness affect the consumers acceptance of ads, which may lead them to respond more positively or negatively when personalized communications are present.

The study provides advertisers, marketers, and companies in the Portuguese market, that want to use or have already used AI, with insights about the consumers perceptions of the use of AI in online advertising in Portugal (Aguirre et al., 2015; Chen et al., 2022), to understand how valuable personalized ads are to customers along their online journey and how personalized online advertising can be adapted through Artificial Intelligence (Mussa, 2020; Rodgers & Nguyen, 2022). This allows companies to understand what level of ad personalization should be undertaken and what factors influence the consumer experiences with personalized ads. Finally, the research supports existing theories and literature by providing new conclusions regarding the existing paradox between personalization and privacy concerns (Antonio et al., 2022; Gerdman et al., 2017; Xu et al., 2011; Zhu & Chang, 2016) and supports future research by academics to further explore consumer perceptions regarding the use of AI.

The research is composed by context of the dissertation, identifying the research gap, the questions and the objetives of the study. Then, a literature review was conducted to collect the conclusions obtained by the authors of top journal, articles, books and dissertations on the topic and to identify the hypotheses and the model to be tested. Previously, the methodology used to understand the consumer perceptions in the face of the use of AI in online display ads and the circumstances in which they change, is presented, namely online questionnaire and eye tracking study. Finally, the main conclusions of the study and its contributions are described.

2. LITERATURE REVIEW

The research was conducted using online databases and academic search engines, namely Google Scholar, Run Repository Nova University, Nova Discovery, Elsevier, and Scopus. In order to find relevant documents on the topic, the search was conducted in Portuguese and English. For this purpose, keywords such as “Consumer perception of the use of artificial intelligence in online advertising during the customer journey”, “Impact of Artificial Intelligence on consumer perception”, “Use of artificial intelligence in personalized online ads”, “Use of artificial intelligence throughout the customer journey”, “Impact of artificial intelligence in digital marketing”, “Personalization-privacy concerns paradox” and “Influence of the use of AI in online display ads in the perception of consumers” were used.

The research began by searching for relevant articles in top journals, classified as Q3 and Q4 in the SJR – Scimago Journal Rank Indicator. Due to the absence of top journals on the topics, the search had to be extended to academic thesis, books and reports, and later the reading of the papers and articles that were mentioned as bibliographic references in the previous documents.

In this way, a total of ninety-four articles, reports, books, and dissertations were evaluated according to the previously established criteria. The first step was to exclude articles and thesis that were duplicated, due to storage errors, eliminating seven from the initial number. Afterward, the title, abstract, and conclusion of the remaining literature were analyzed, and thirty-eight documents were excluded because they did not contain sufficient information for the study. Finally, forty-nine documents were selected for more in-depth reading. In the end, only thirty-two relevant documents remained.

In the table below (Table 1), there is a summary of the documents considered most relevant of the literature review:

Reference	Keywords	Title	Purpose	Research Method	Conclusions	Limitations
(Aguirre et al., 2015)	Personalization paradox; Information collection; Trust-building strategies; Vulnerability; Psychological ownership	*Unraveling the Personalization Paradox: The Effect of Information Collection and Trust-Building Strategies on Online Advertisement Effectiveness*	The existence of the paradox between Personalization and Privacy Concerns, and to determine whether data collection through social networks is a determining factor for consumer reactions to personalized ads	An exploratory field study was conducted on Facebook	Consumers when exposed to more personalized ads, there is a greater probability of interaction. Consumers feel more vulnerable when personalization causes them discomfort and therefore consumers' interactions with ads decrease when companies collect information covertly. However, if the personalized ads are from a trusted brand, this reduces the negative effects. Nevertheless, it is considered that consumers react differently depending on the level of personalization presented and how their personal information is collected.	A hypothetical buying scenario was used in the experiment, which does not allow for generalization as results in real life may vary. Only Facebook online publishers were considered, and other online publishers may present different results.
(Ahmad et al., 2015)	–	*Programmatic Advertising's Effect on Consumer (Artificial Intelligence Technologies in Advertising and Marketing on Consumers Decision Making)*	Investigate the impact of Machine Learning and Artificial intelligence on consumer behavior and measure the level of trust	A qualitative method for Sweden consumers	The consumer considers that ads generated through machine Learning are more reliable, and more relevant content compared to traditional ads and allow consumers to have immediate access to information about the product or service. However, the lack of transparency is highlighted, most respondents prefer more personalized advertisements that meet their needs. Thus, it is concluded that artificial intelligence can help companies, as participants, in general, accepted the use of Artificial Intelligence in marketing and it has a direct effect on consumer behavior.	Reduced number of participants due to the Covid-19 pandemic and focusing only on Swedish citizens.
(Ameen et al., 2021)	Artificial intelligence; Customer experience; Trust-commitment theory; Trust; Beauty brands; COVID 19	*Customer experiences in the age of artificial intelligence*	The study aims to understand how the integration of artificial Intelligence can improve the customer experience in the shopping sector	Online questionnaire for European consumers who have already used an beauty brand AI-enabled service	The role of consumers trust, and perceived sacrifice influences the perception of AI-enabled service quality and personalization. The greater the confidence consumers have in the brand and the greater the convenience of personalization, the greater the probability of interacting with it and feeling less sensitive to what they are sharing.	The study carried out was based on a small sample, not allowing generalization.
(Antonio et al., 2022)	Advertising; E-Commerce; Data Privacy; Online Advertising; Targeted Advertising	*Invasion or Personalization: An Overview on User Attitudes towards the Privacy Issues in Targeted Advertising in NCR and Its Effect on Consumer Purchase Behavior*	Explores the Philippine user's perception of targeted advertising, the concern with data privacy, and the influence on purchasing behavior	A quantitative method, namely an online questionnaire to Philippines residents who have already shopped online	Consumers are concerned about protecting their personal data. However, consumers who see targeted ads as personalization find it easier to make their purchase online, as the ads facilitate their online experience, but consumers who consider it an invasion of privacy probably did not make their purchase online.	The study focused on residents of NCR, Philippines.

(Chen et al., 2022)	Qualitative research, Consumer perception, Artificial intelligence, Marketing communication, Smart speakers	*Consumers' perception of artificial intelligence applications in marketing communication*	Explores the consumer perception of Artificial Intelligence in personalized advertising copy	Interviews with USA consumers, that own AI devices, and have experiences with AI-enabled marketing communications	Consumers have been acquiring more and more knowledge about AI applications and have started to develop their perceptions based on the functionality of communications and the emotions that make them feel. It is concluded that the perception of consumers about AI applications is fundamental for their acceptance, which can be seen as a help in the daily lives of consumers or as a threat at different levels, highlighting the existing paradox between personalization and privacy concerns. Most participants demonstrated a neutral attitude toward AI marketing communications.	The sample used was only made up of Americans, who had a higher educational background.
(Corrêa, 2019)	Consumer Journey	*Inteligência Artificial, Smart Marketing e Jornada do Consumidor: Um Mapeamento Exploratório de Iniciativas e usos por Organizações*	The impact of technological innovations on the consumer's journey and how companies implement the technologies	Systematic Literature Review	Artificial Intelligence makes it possible to make decisions in real-time identify trends and minimize risks, bringing countless benefits to companies, one of which is the customer journey improvement.	–
(Deng et al., 2019)	–	*Smart Generation System of Personalized Advertising Copy and Its Application to Advertising Practice and Research*	Development of a smart generation system to create personalized content for advertisements (SGS-PAC) in line with consumer needs	An Experimental design was carried out on faculty members, Master of Business Administration Students, and graduate students.	The framework can be used to define the design analysis and text pre-processing systems for creating custom copy for ads. Consumers prefer advertisements with personalized copies rather than more generic ads. For companies, personalized copy allows for increased efficiency in information search and helps the customers to understand what products or service presented consists of.	The framework was only tested on Chinese advertising copies, being very specific and difficult to generalize. Secondly, the participants had many different roles during the experience, and it was not possible to receive feedback from real customers.
(Gerdman et al., 2017)	–	*An exploratory study on perceptions of personalised display ads online (A comparison of Swedish generations: Do consumers willingly surrender their privacy for the usefulness of personalised advertising?)*	Studies the behavior of Swedes consumers of different generations about the intrusion of personalized banner advertisements on their privacy online	Semi-Structured and in-depth interviews with Swedish internet users of different age groups and industry professionals	Consumer behavior is affected due to the intrusiveness or usefulness that advertisements provide. The comparison of different generations showed that elderly consumers are less aware of personalized ads, which leads to greater concerns with data and a feeling of intrusiveness, which leads them to demand transparency. The younger generation is more irritated by ads, while generation Y adapts its behavior depending on the content of the ad, having a higher level of acceptance. All generations say they prefer ads based on their previous searches but provide them with new content.	–

(Gomes, 2022)	Artificial Intelligence; Machine Learning; Deep Learning; Data Analysis; Neural Networks; Algorithms; Marketing; Effects; Challenges; Ethics	*Inteligência artificial no marketing, ética ou manipuladora?*	The effects of Artificial Intelligence in Marketing at the touchpoints with the consumer, the ethical considerations, and the technology used	Systematic Literature Review	A new era has begun, in which Artificial Intelligence is present in all social processes and is considered omnipresent. AI allows the collection of large amounts of data, performs repetitive tasks more quickly and efficiently, and anticipates consumer preferences. Personalization is one of the main functions of AI, capable of intensifying consumer interactions with the brand.	–
(Hjelm & Suhonen, 2021)	Artificial Intelligence; Machine Learning; Digital Marketing; Consumer Perception; Discernment Ability	*Consumer perception of machine-generated advertisement*	The consumer perception of the machined-generated advertising campaigns, through short messages services and emails	A mixed-method approach, consisting of interviews and an online questionnaire	The use of AI allows a better understanding of consumers and the development of personalized advertisements based on their interests, although the relevance perceived by consumers and trust are essential factors in the acceptance of advertisements.	The sample used for the study is small and the study does not have the necessary variables to carry out the content analysis.
(Kietzmann et al., 2018)	–	*Artificial Intelligence in Advertising: How Marketers Can Leverage Artificial Intelligence Along the Consumer Journey*	Investigates the impact of the use of Artificial Intelligence along the customer journey to marketers.	Systematic Literature review	Artificial intelligence changes the way marketers interact with customers. With Artificial Intelligence techniques, advertisers will be able to collect a great amount of consumers' personal data, gaining powerful insights to communicate with customers at every stage of the customer journey.	–
(Krafft et al., 2017)	Communication; Interactive marketing; Privacy concerns; Permission marketing	*Permission Marketing and Privacy Concerns—Why Do Customers (Not) Grant Permissions?*	The author seeks to identify the factors that influence the consumer's predisposition to give permission to receive personalized content through the development of a framework	Online questionnaire for consumers in Germany	Consumers are concerned about who has access to their data and how they are used, making it essential to offer benefits in exchange for their data. However, there are two factors capable of reducing concerns about access to the consumer's personal data, namely the message content and its relevance to the consumers. Nonetheless, consumers with a high privacy concern generally have a negative attitude toward personalized messages and those who have a high level of trust towards them focus less on psychological costs.	The study was carried out only in Germany, and it is not possible to generalize the results regarding privacy concerns and avoidance.

(Kumar et al., 2019)	Artificial Intelligence; CRM Technology; Customer Relationship Management, Customization, Marketing, Personalization	*Understanding the Role of Artificial Intelligence in Personalized Engagement Marketing*	The importance of Artificial Intelligence in delivering personalized engagement marketing to consumers	Framework creation	The consumers are prepared for Artificial Intelligence adoption, capable of facilitating real-time learning and improving the consumer value proposition. The consumer's decision process about an offer is carried out based on knowledge of alternatives and the relevance of the offer's information to the consumer's knowledge. However, consumers with less knowledge make more comparisons between offers.	–
(Larva, 2021)	–	*Consumer Perceptions on the use of Artificial Intelligence in Marketing*	The USA and Finland consumer's perception comparison on the use of Artificial intelligence in Marketing	An initial questionnaire and interviews	The consumer's relationship with Artificial Intelligence can vary depending on culture and factors. At the factor level, trust and usefulness are considered factors that positively influence AI usage, while factors such as intrusiveness and risk have a negative effect on AI acceptance. Regarding the culture, Finnish consumers are more open to adopting AI while Americans are more concerned about personal data being analyzed. However, both agree that Artificial Intelligence is useful not only for consumers but also for marketers.	The questionnaire used an untested measurement scale and was answered by a small number of people. The scarcity of resources to carry out more interviews was another limitation presented in the research.
(Li et al., 2013)	–	*Measuring the Intrusiveness of Advertisements: Scale Development and Validation*	This research studies the consumer's perception of the advertisement's intrusiveness, through the creation of a measurement scale of the level of intrusiveness using traditional methods	Experience Design, which consisted of exposure to an ad, and a questionnaire	Consumer skepticism is directly related to the negative experience with ads, due to the tactics implemented by advertisers. Advertisements are considered intrusive by consumers when they interrupt the consumer's cognitive process when they appear. In this way, when an advertisement is considered intrusive by a consumer, a feeling of irritation may be developed, which leads to negative attitudes towards it.	The items that make up the measure of intrusiveness suggested by the authors are reduced and the sample used was only composed of students. Finally, the feeling of intrusiveness expressed during the experience may be biased due to the first ad viewed.
(Moura & Reis, 2021)	Artificial Intelligence; Customer Journey; Customer Experience; Personalization	*O impacto da inteligência artificial no customer journey*	Investigates the impact of Artificial Intelligence on the Customer Journeys importance, and possible use in E-commerce	Systematic Literature Review	Artificial Intelligence can be applied to contribute to personalization and customer support during the consumer journey, to improve the consumer experience and loyalty, and to guarantee a competitive advantage over the competition.	–

(Munyengeterwa, 2021)	–	*The Impact of Artificial Intelligence in the Customer Journey: A Case Study of Bosch USA and Defy South Africa Case Study of Bosch USA and Defy South Africa*	The consumer's perception of the use of Artificial Intelligence Techniques along the customer journey by the Bosch USA and Defy South Africa through the lens of Diffusion of Innovation Theory	A mixed-method approach, consisting of In-Depth interviews and a content analysis case study	The consumer's perception of Artificial Intelligence influences the adoption of AI tools by companies along the customer journey. The adoption of Artificial intelligence is influenced by trust, over-targeting, social groups, and the lack of knowledge about the technology, which can lead to distrust in the advertisements, which may result in targeting ads being seen as an invasion of privacy.	The study had limitations at the level of the methodology used, due to having a small sample as it is an analysis of only two organizations, making it impossible to generalize.
(Mussa, 2020)	Artificial Intelligence; AI; AI in Marketing; Consumer Behaviors; Online Retailers; Consumer Journey; Big Data; Machine Learning; Deep Learning; Algorithms.	*The impact of Artificial Intelligence on Consumer Behaviors. An Applied Study on the Online Retailing Sector in Egypt*	Explores the impact of artificial intelligence on consumer behavior within the retailing sector	A quantitative method, namely an online questionnaire	The implementation of Artificial Intelligence at all stages of the consumer journey allows a better understanding of the consumers and the development of personalized messages at each stage, leading to the existence of a relationship between Artificial Intelligence and Consumer Behavior.	The study was carried out with a reduced number of respondents, not being representative of the population's perception, and focused only on the benefits of applying artificial intelligence.
(Oliveira & Pessoa, 2021)	Artificial Intelligence; Marketing; Mobile; Wellness	*"O Futuro Presente": Influência da Inteligência Artificial na qualidade de vida do consumidor*	The influence of Artificial Intelligence on consumer well-being during mobile research	Literature Review and semi-structured interviews with consumers who use mobile phones to access the internet	Artificial Intelligence main application is the use of consumer data to understand consumer needs and wants, to better communicate with them. Most participants demonstrate a lack of knowledge of AI techniques, and they are dissatisfied with the very invasive practices of online advertisements, as they feel uncomfortable with the bombardment they are targeting and are concerned about the protection of personal data.	Reduced sample of respondents due to the Covid-19 pandemic.
(Rosa, 2021)	Online Targeted Advertising; Advertising Avoidance; Perceived Risk; Negative Emotions; COVID-19; Pandemic	*Publicidade e os Limites da Privacidade: Percepção dos Usuários a Anúncios Personalizados*	Study the consumer's perception of online personalized advertisements	Bibliographic research and a questionnaire	Generation Z is more concerned about the collection and use of their data. The respondents showed little knowledge about the use of their data. In this way, it is considered that the lack of knowledge influences the perception of invasion because when people don't know how companies collect data, they have less privacy concerns. However, data protection laws are critical but increasing restrictions on the use of customer data could lead to a decrease in personalization.	–

Table 1 - Literature Review Table

2.1 ARTIFICIAL INTELLIGENCE

The term, Artificial Intelligence (AI), appeared in 1956 by the voice of John McCarthy (Gomes, 2022). Artificial intelligence is non-human Intelligence responsible for assisting in the collection, analysis, and efficiently interpretion of large amounts of structured and unstructured consumer data and past experiences from multiple sources (Kietzmann et al., 2018), and learn from that, enhancing the quality of response to consumer's needs (Ribeiro, 2021) through computacional techniques (Puntoni et al., 2021).

AI seeks to replicate human thinking through algorithms (Ahmad et al., 2015; Corrêa, 2019; Rodgers & Nguyen, 2022; Longoni et al., 2019), providing powerful real-time insights that are essential for the creation and automatic adaptation of communication strategies to consumer preferences and needs (Ameen et al., 2021; Yu, 2022; Puntoni et al., 2021), by making it possible to understand which channels they prefer and at what stage of the journey they are (Moura & Reis, 2021). The more customer data available to algorithms, the more they learn and become more effective over time, to achieve predefined goals (Oliveira & Pessoa, 2021).

The peak of the use of AI occurred nowadays due to the increase in computing power, in the amount of data available and in the number of people qualified to work with the tools, and the decrease in the costs of using this tools (Hjelm & Suhonen, 2021). However, AI has not yet reached its maximum capacity, as are still learning through human engagement so that can then replicate (Ribeiro, 2021) and the ability to analyze text, voice and images are still limited (Davenport et al., 2020).

Artificial intelligence comprises several technologies: visual perception, speech recognition (Longoni et al., 2019), decision-making, speech and image recognition (Mussa, 2020; Yu, 2022), machine learning, neural networks and natural language processing (Davenport et al., 2020). In this way, AI contributes to a wide variety of areas: Marketing, as programmatic digital ads and recommendation systems (Davenport et al., 2020; Puntoni et al., 2021), Culinary, as Intelligent refrigerators and kitchen robots (Gomes, 2022; Ribeiro, 2021), Medicine, such as health monitoring devices (Longoni et al., 2019) and Salesforce, as virtual assistants.

Additionally, AI has the capability of predictive analytics, which allows to recognize existing patterns in the collected data and anticipate possible behaviors (Kumar et al., 2019; Munyengeterwa, 2021), which enables better segmentation and understanding of each customer's preferences so that their needs can be efficiently satisfied in real-time (Ahmad et al., 2015; Xi, 2020), which have been changing the way value is delivered (Kumar et al., 2019).

Nowadays, data is considered the oil of modern times, necessary to achieve the objectives. Without customer data, AI would cease to exist, as it would no longer have inputs from which

algorithms could learn (Gomes, 2022; Ribeiro, 2021), and it would be difficult to understand consumers (Rosa, 2021).

The acceptance of AI is not homogeneous, with some customers having a positive opinion and others, on the contrary, believing that AI raises some concerns, namely privacy concerns (Davenport et al., 2020), loss of control of their data and lack of human contact, and authors such as Ribeiro (2021) believe that AI can remove several jobs, but other articles reinforce that humans and artificial intelligence assistants should be complementary (Ahmad et al., 2015; Kotler, 2021; Munyengeterwa, 2021) and should work cooperatively to improve their capabilities mutually (Davenport et al., 2020). Therefore, customers opinions about AI may vary, with customers tending to have positive perceptions of AI when the benefits exceed the risks they are exposed.

Artificial intelligence is a machine, as it does not have in consideration the unique charateristics of each consumers (Longoni et al., 2019; Puntoni et al., 2021) and the emotional abilities of humans to understand the customers sentiments (Ahmad et al., 2015), and cannot adapt to what consumers are feeling (Davenport et al., 2020), making them feel uncomfortable. However, Xi (2020) believe that artificial intelligence algorithms are superior to humans in terms of predictive analytics, more assertive decision-making, and problem solving based on the knowledge acquired but have difficulty predicting customer behavior when customers choose not to provide information (Hjelm & Suhonen, 2021; Moura & Reis, 2021). Therefore, it is important to understand consumers perceptions regarding the use of Artificial Intelligence (Puntoni et al., 2021), as consumer's opinions influence its acceptance (Munyengeterwa, 2021).

2.2 Artificial Intelligence in Marketing

Nowadays, AI is transforming the way companies communicate with customers and with society itself, based on insights gained from consumer personal data, and how consumers search for information about products or services they need (Ameen et al., 2021; Davenport et al., 2020; Deng et al., 2019; Munyengeterwa, 2021; Puntoni et al., 2021; Rodgers & Nguyen, 2022).

Artificial intelligence has a great importance in marketing, where it is increasingly used to better understand consumers' desires and to identify patterns in their behaviour (Ahmad et al., 2015; Oliveira & Pessoa, 2021; Ribeiro, 2021), allowing to make better and more efficient marketing decisions (Kietzmann et al., 2018), adapting their strategies to the customers' interests and developing a lasting relationship with customers, increasing their loyalty (Xi, 2020). This way,

with AI, marketers have the opportunity to put consumers at the center of their decisions, developing consumer-centric ads, making customers feel special (Corrêa, 2019; Hjelm & Suhonen, 2021).

The consumers interests are constantly changing and with the advent of the internet, consumers share information through different channels, websites, social media, among others, and have been changing the way customers go through their customer journey to make their purchase decision, making it more difficult for companies to collect personal information (Kietzmann et al., 2018). In this way, companies need to adapt to them in order to increase the success of their communications (Oliveira & Pessoa, 2021), using AI tools to collect consumer information often stored by cookies placed in the customer's browser to follow the consumers journey (Gerdman et al., 2017), gathering fundamental insights to better define customers profiles (Xu et al), enabling to deliver a more valuable experience by exposing customers to more relevant information (Rosa, 2021). However, consumers have the option to delete the cookies after they leave the website or reject all cookies, which is a challenge for companies as they are no longer able to identify the consumers during their online searches (Gerdman et al., 2017).

Companies have been using AI to capture consumer needs, with the aim of improving the processes performance and automating repetitive daily tasks through real-time adaptation (Kumar et al., 2019; Moura & Reis, 2021). Therefore, AI contributes to a variety of marketing areas such as: predictive analysis of customer preferences and behavior, collection of customers opinions on social networks, consumer support, search engine optimization, recommendation engines (Puntoni et al., 2021), efficiency of data analysis, programmatic digital ads, sending emails and messages (Davenport et al., 2020), presentation of offers in telemarketing and physical stores and optimization of real-time decision-making that enables better contact with customers (Chen et al., 2022; Larva, 2021; Gomes, 2022; Oliveira & Pessoa, 2021).

Additionally, AI helps with customer segmentation (Davenport et al., 2020). Segmentation consists of dividing customers into homogeneous groups of people with the same interests, and the company can then choose which target segment to reach and adapt its communications to them (Corrêa, 2019). It is important to find the right segment to reach with its personalized offers and focus efforts to reach these customers.

Therefore, AI can bring benefits to the companies such as reducing operational costs (Kumar et al., 2019), contributing to problem-solving (Chen et al., 2022; Xi, 2020; Yu, 2022), improving the online experience, which contributes to greater consumer loyalty (Ameen et al., 2021),

reduce less efficient human labor and errors (Yu, 2022), increasing productivity (Xi, 2020), and helps deliver an optimal customer value proposition.

2.3 AI ALONG CUSTOMER JOURNEY

The consumer journey is a process composed of all the stages that customers go through during their experience with the company until they make their purchase decision and even after purchasing the product/service (Munyengeterwa, 2021). As a result, it is important to guarantee great efficiency and relevance in all points of contact with the customer to differentiate itself from the competition. A good customer journey increase the value delivered and consumer satisfaction and loyalty (Corrêa, 2019; Moura & Reis, 2021).

Knowledge of the customer journey plays a very important role in marketing to understand customers and the way in which their purchasing decisions are made, with the aim of adapting the communication strategies, to deliver a relevant ad at the right moment. In this way, companies must capture the attention of consumers from the first moment, providing personalized interactions at all stages of their journey (Munyengeterwa, 2021).

The introduction of Artificial Intelligence is a great help in all stages of the consumer journey, reducing the effort and time required at each stage, allowing the customers to spend more time doing tasks that they enjoy (Puntoni et al., 2021), delivering a better online experience and providing information to the customer whenever the client wants (Mussa, 2020). AI allows to present the appropriate message to the customer, taking in consideration the needs, wants and interests shared in several channels, adapting the message to the stage of the journey the customer is in, to reach consumers more effectively (Rodgers & Nguyen, 2022).

The consumer journey has at least five stages, starting with need recognition, information search, alternative evaluation, purchase and post-purchase (Kietzmann et al., 2018).

The first stage is Need Recognition, where the consumer recognizes the need for a product/service that has yet to be satisfied (Kietzmann et al., 2018). In the first stage, AI makes it possible to better segment customers and predict their needs through predictive analysis (Munyengeterwa, 2021) based on the data collected, allowing to adapt the content in real-time (Mussa, 2020), so that the customer is interested in clicking on the advertisements to learn more about the advertised product/service.

The second stage is Information Search. In this step, consumers search for information about products and services capable of satisfying their needs (Kietzmann et al., 2018; Mussa, 2020). The search for information can be done internally, when consumers think of brands they know

and which they have already bought when looking for products to satisfy their needs (Corrêa, 2019), and later can search the internet, visit stores and ask for opinions (Ahmad et al., 2015).

Consumers have more and more access to all the information they need to make their purchase decision, they often make a choice based on their knowledge about the alternatives (Kumar et al., 2019). At this stage, AI predict what consumers may want (Davenport et al., 2020) and chooses the best content to present to customers according to their interests, to differentiate themselves from the competition (Corrêa, 2019).

The third stage is the evaluation of the alternatives, the customers will evaluate and compare which is the best choice to satisfy their needs, among the presented products (Ahmad et al., 2015; Kietzmann et al., 2018).

Companies must offer content that transmits relevant information about the product and presents the advantages of choosing the product/service instead of a competing brand, highlighting its products as the best choice (Mussa, 2020).

The penultimate stage is the Purchase, where AI can facilitate the purchase process. The consumer makes his purchase decision taking into account the value that the product/service can bring to them. The value that consumers will obtain when purchasing the advertised offer should be highlighted by communicating the convenience for consumers to buy it (Kietzmann et al., 2018), like add call to action to the ads.

Post-purchase is the last step, it refers to the behavior after purchasing the product. Many times customers express an opinion, for example if they are satisfied they can share their product with family and friends, through word-of-mouth, being able to influence others to acquire products/services of the brand. However, if they are dissatisfied, it can be harmful to the company, as they have a negative opinion of the company's products/services. In the last stage, companies are responsible for following up their customers, analyzing the feedback that customers provide about products/services and the purchase process. That said, AI makes it possible to monitor consumer opinion about the product purchased, to improve the customer support and promote offers similar to those purchased by customers, encouraging the cross-selling and upselling (Corrêa, 2019; Mussa, 2020).

Previous studies suggest that the journeys depend on each customer. The customer can change the order of the steps, can make their purchase decision more quickly without going through all the steps, as they have access to a lot of information to make their decision or giving up on the purchase, not giving companies time to understand what are their needs and present information to satisfy it (Mussa, 2020). However, consumers who conduct their experience online are more likely to re-order steps in their journey (Rodgers & Nguyen, 2022).

Studies show that consumers' perception during the customer journey can vary according to different factors and circumstances (Ameen et al., 2021). The factors capable of influencing the acceptance of AI are, namely age, gender and the relevance of the content (Davenport et al., 2020), trust, social group, knowledge, invasion of privacy, loss of control, intrusiveness, over-targeting, and the value delivered to customers (Vieira & Magano, 2021).

2.4 PERSONALIZED ADVERTISING

Advertising consists of promoting products or services to show what companies have to offer to their customers. Currently, it is possible to find ads anywhere, even when consumers record an episode of a series that they like to see on television and when they go to watch the recording, an ad are already exposed there too. Ads often interrupt consumers experience, especially in the online universe, being considered intrusive and seen as noise by most consumers. There is thus a great need to companies to understand their customers in particular, to gain as much knowledge as possible about preferences and act accordingly (Deng et al., 2019).

Online personalized ads have changed the world of advertising. In the past, the communications developed were brief, generic, uninformative and ineffective (Oliveira & Pessoa, 2021). However, with the emergence of new technologies, the customer journey is becoming more complex by the day (Munyengeterwa, 2021). The customers needs and wants are increasingly demanding and are expressed in several channels simultaneously (Kietzmann et al., 2018). In this way, customers expect special treatment from companies to meet their needs, as they expect to have access to all the information they need in real-time, having more options to make their decision from, and making more and more comparisons between products before making their purchase decision (Oliveira & Pessoa, 2021), which leads to the necessity of companies to adapt to the new reality and invest their efforts in improving consumers' online experiences (Gerdman et al., 2017; Gomes, 2022). Therefore, companies need to develop ads adapted to each customer specifically based on the customer's profile during their online experience, something that was not possible through traditional advertising, where for example several people could be watching television at the same time in the same house and the same channel is watched by several people throughout the country (Rosa, 2021), it is not possible to customize to a particularly customer. Nevertheless, it is believed that the more personalized for each consumer, the more interesting they can be, as they consider that the content is of higher quality (Ahmad et al., 2015).

This way companies started to focus their monetary and operational resources on AI, to capture powerful insights to the personalization of ads and develop a personal touch to brand communications with customers (Chen et al., 2022; Kietzmann et al., 2018), along the different stages of the online consumer journey (Antonio et al., 2022), from need recognition, information search, evaluation, purchase decision and post-purchase (Mussa, 2020).

Personalized display advertising, a form of targeted advertising, has become an important marketing strategies used by companies to send personalized communications, bringing great opportunities for the companies to capture consumer attention (Aguirre et al., 2015). This marketing strategy allows for delivering personalized relevant content appropriate to each customer (Gerdman et al., 2017; Munyengeterwa, 2021; Xu et al., 2011), to satisfy consumers' needs (Wang et al., 2022), which contributes to customer acceptance, with the aim of increasing the value delivered to customers (Ahmad et al., 2015; Kumar et al., 2019; Xu et al., 2011). This way, by meeting the innovation that exists in the market, companies can capture the customer attention, in order to reach the objectives predefined by the company, ensuring a competitive advantage.

This way, consumers belonging to different segments will be exposed to different ads (Deng et al., 2019), and may have differences in terms of copy, layout and images used, based on their personal data, purchase history and the stage the clients are in their journey. The prices shown in the advertisements can also be customized for example, if it is a client who wants to stop buying from the company, perhaps an advertisement showing lower price can capture their attention. This way, through AI companies are able to present different prices for each customer (Corrêa, 2019), that are good to the consumer and the company itself (Davenport et al., 2020).

Previous studies consider that ads in which the content meets the needs of the consumer have a higher success rate and effectiveness, considering that when consumers are faced with personalized ads, they are more willing to interact with them than with a generic ad (Aguirre et al., 2015; Deng et al., 2019; Gerdman et al., 2017), boosting the click rate (Chen et al., 2022; Wang et al., 2022) and simultaneously increase visibility the brand by presenting relevant offers (Kietzmann et al., 2018; Yu, 2022). However, if a consumer is exposed several times to the same ad, it will become irrelevant and should no longer be shown to the customer, and take note that ads like the one shown do not capture the attention of authors. In this way, Artificial Intelligence has the ability to decide which is the best offer to present to the customer (Ameen et al., 2021; Antonio et al., 2022; Yu, 2022).

However, consumers are exposed to large amounts of advertisements daily (Deng et al., 2019), at any time due to the flexibility provided by new technologies (Ameen et al., 2021),

which is a challenge for companies, because due to the high number of advertisements, there is a greater probability that customers will not focus on the advertisements, ending up ignoring, failing to interact and even being able to develop a negative attitude towards the company, as they end up seeing the advertisements as noise, something that disrupts the consumer's search (Li et al., 2002).

In this sense, personalization can be seen positively or negatively by customers, depending on the circumstances, leading to an existing paradox (Aguirre et al., 2015). Consumers' perceptions about personalized ads may vary in terms of age, nationality, culture, knowledge (Gerdman et al., 2017), level of personalization, and trust. In this way, the perception of customers regarding the use of AI in personalized ads is a very important topic to be studied in depth, since the perception of consumers to personalized ads affects the acceptance of AI and their reaction when faced with such ads.

2.5 Privacy Concerns vs Personalization Paradox

Since personalized advertisements appeared, it has been a subject with different opinions from consumers. Rising the paradox of personalization vs privacy that until know has not been resolved.

The consumers have a positive perception of personalized advertisements when they are relevant to their needs and believe that the ads bring convenience by offering real-time information on the products they need, making the exchange of information with customers more efficient (Ameen et al., 2021; Chen et al., 2022), reducing the concerns about the use of their data, e.g. customers are willing to give up their data if this allows them to access relevant content (Zhu & Chang, 2016), playing an important role in accepting advertisements (Hjelm & Suhonen, 2021).

On the other hand, not all the consumers have a positive attitude towards personalized ads (Puntoni et al., 2021), as personalization is seen by many as an invasion of their privacy (Aguirre et al., 2015). The negative perception of AI can be reinforced by the feeling of risk that customers may face of advertisements developed by AI (Larva, 2021), when they consider that they do not have control over their data (Puntoni et al., 2021).

Consumers who consider that personalization is excessive can make them feel overwhelmed, such as the appearance of an ad about a product they have just researched or were talking about, this can lead to the development of a negative attitude against the brand responsible for it (Davenport et al., 2020). Therefore, the best way to minimize the impacts of these

paradoxes is to take into account the consumers' perception of the communications to which they are subject (Zhu & Chang, 2016), to adjust the personalization to each client (Oliveira & Pessoa, 2021).

As mentioned before, privacy concerns can lead to a decrease in interaction with personalized ads, as consumers feel uncomfortable with the fact that their data is used for other purposes (Aguirre et al., 2015). The main consequences are the ads blindness or block the advertisings, and the decrease in acceptance of data processing permission by companies, choosing not to provide access to their personal data, such as location, name, age, gender, etc., leading to companies no longer having enough information to customize offers specifically for each customer (Xu et al., 2011).

In this sense, information is essential for the development of personalized advertisements, representing a great challenge for companies these days, due to the GDPR law, that implement the need for explicit consent of customers, because using customer data without their permission negatively influences customers' perception (Aguirre et al., 2015). As the author Chen et al. (2022) consider that knowledge about AI is fundamental to structure the opinion regarding its use, as customers consider the advertisements are more relevant when they have the knowledge of the use of their data, reducing the feeling of vulnerability.

This leds to the “personalization vs invasion paradox”, where customers may value the information that is provided based on their needs, desires and interests, and may be willing to provide their data in exchange for personalized advertising that is interesting to them (Cloarec, 2022; Xu et al., 2011; Zhu & Chang, 2016) and capable of reducing their effort (Ameen et al., 2021), at the cost of losing their privacy (Krafft et al., 2017) to facilitate their journey, because if they didn’t give consent they would end up taking more than twice as long to complete their journey.

On the contrary, may feel uncomfortable with the excessive collection and use of their online behavior data, highlighting the privacy concerns when sharing personal data, considering an invasion of privacy. This negative sentiment can influence the behavior of the consumer towards the brand (Wang et al., 2022), deciding on products or services different from those mentioned in the personalized ads just to show that they are not influenced by the companies marketing strategies (Chen et al., 2022).

Therefore, consumers perform a real-time comparison in which they compare the cost and benefits they will have to get access to personalized information about products they are looking for (Davenport et al., 2020; Xu et al., 2011). When they consider that there are greater disadvantages than the perceived value they will achieve, their privacy concerns increase.

Thus, it is concluded that the benefits delivered to customers must always be greater than the cost perceived by them.

Consumers who do not appreciate AI enabled personalized ads, consider that personalized ads can make them spend more money and buy products/services they not need and deliver excessive information, leading them to feel uncomfortable because they consider that companies know everything about them (Wang et al., 2022) and use information to influence them (Chen et al., 2022). However, many of them appreciate personalized communications, entering a conflict called the personalization-privacy paradox.

This way, consumers how see personalized ads as intrusive tend to ignore ads because they consider that ads developed by AI can jeopardize the privacy of their data (Krafft et al., 2017), and may develop negative attitudes towards the brand (Wang et al., 2022), when they consider that ads interrupt their research, reducing the consumer acceptance (Gerdman et al., 2017). However, if they feel that the advertisements were created only to help and not to make decisions for them, they end up being more interested in the advertisements (Vieira & Magano, 2021).

However, trust in the brand, consumer satisfaction, the relevance of the content, and the opinion of the social group are some of the factors capable of influence positively the concerns about data protection. On the contrary, intrusiveness is one of the reasons that may lead consumers to avoid sharing their data, as they consider it would not be beneficial (Krafft et al., 2017).

Trust is an important factor, as trust in the brand influences consumers' perception of advertisements. If the customer trusts the brand and is clearly informed about the use of their data, there is a greater probability of accepting the feeling of vulnerability, reducing the negative effect of using their data without their consent (Aguirre et al., 2015), being more willing to give access to their information (Corrêa, 2019). In this way, companies must guarantee the protection of consumer data and the transparency of how data is collected and analyzed is fundamental, so that they feel safe in sharing their information and that it is not misused (Gerdman et al., 2017; Xu et al., 2011), because if consumers believe that companies have a lack of transparency can feel betrayed (Puntoni et al., 2021).

Hjelm & Suhonen (2021) consider that the way advertisements are presented and constructed influence the perception of consumers. Others also consider that the relevance of the content

is a factor that influences consumers' perception of advertisements, being able to reduce concerns about privacy (Zhu & Chang, 2016).

It is concluded that the perception that consumers have in relation to personalized ads influences the effectiveness of AI tools, because if consumers have a negative perception of ads, they are less likely to not want to interact with them and choose not to buy of the brand (Gerdman et al., 2017). In this way, it is important to put ourselves in the customers' shoes, to understand what they have to put into question when accepting advertisements with artificial intelligence, to conclude what contributes to their acceptance. Therefore, the content provided to customers must be valuable in order to minimize negative feelings towards artificial Intelligence (Larva, 2021).

3. MODEL AND HYPOTHESES DEVELOPMENT

After systematically reviewing relevant literature on the topic and having knowledge of the research objectives and research questions to be answered, a model and the respective hypothesis were defined. The model proposed for this study contributes to understand consumer acceptance regarding the use of Artificial Intelligence in online display ads. The model is composed of factors that influence consumers' acceptance positively and negatively. AI (vs. Human) – enabled ads are integrated into the model as independent variable. Additionally, Privacy Concerns are incorporated as a mediator for consumers' acceptance of AI, and intrusiveness as a moderator.

AI has started to be more talked about recently, the knowledge and confidence in its tools are still very low (Corrêa, 2019), highlighting the importance of understanding the acceptance of consumers about the use of AI in the development of personalized ads, as the perception of them triggers different attitudes, positive or negative (Gerdman et al., 2017). Several authors have mentioned the existence of a greater number of factors that negatively influence the perception of consumers than positive factors (Larva, 2021).

Previous studies reveal that the acceptance of the use of artificial intelligence depends on different circumstances (Larva, 2021; Li et al., 2002). Consumers who appreciate the help in meeting their needs, by companies making available ads about products or services that meet what they are looking for, are more predisposed to accept the use of AI in online advertising (Vieira & Magano, 2021). On the contrary, when consumers consider that advertisements constitute an invasion of their privacy and a loss of control over their decisions, this affects the acceptance of AI and may develop negative attitudes toward the company (Krafft et al., 2017; Wang et al., 2022), leading to brand dilution, being able to choose never to interact with the brand again or ignore all communications made by it.

Currently, some customers still prefer ads developed by humans (Gomes, 2022; Ribeiro, 2021), due to the disadvantages that artificial Intelligence can bring. Therefore, it is essential to understand what consumers prefer about the ads they are exposed to, whether they prefer AI or Human enabled ads, and under what circumstances such perception changes.

With this in mind, the model proposes to investigate the influence of AI-enabled ads vs Human-enable ads in consumer acceptance of online personalized ads, with the aim of understanding which type of personalization is preferred by consumers, to provide powerful insights for

companies that want to communicate with customers through online ads. Having developed the model shown below (Figure 1):

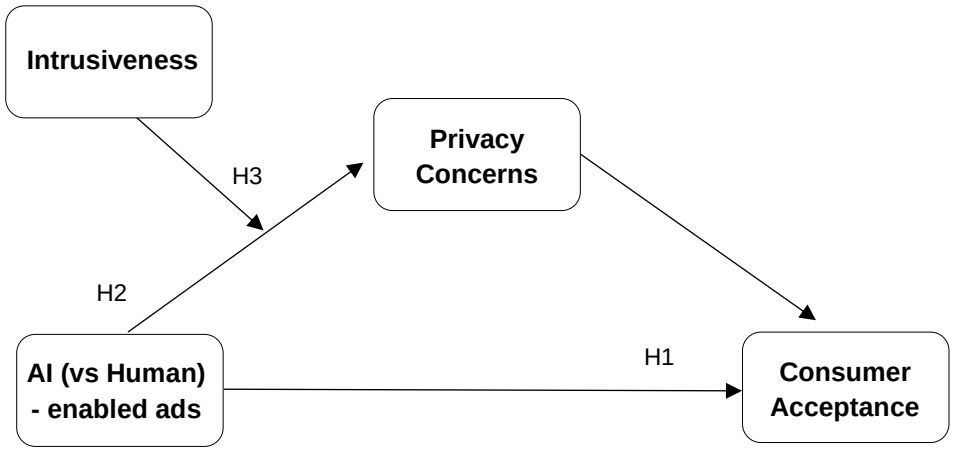

Figure 1 - Conceptual Model

The model integrates AI (vs Human) enabled ads to verify their influence on the development of privacy concerns, considering the negative correlation between privacy concerns and advertising develop through Artificial Intelligence demonstrated in previous studies (Krafft et al., 2017), and consequently the effect on the consumer's acceptance of online personalized ads. AI (vs. Human) enabled ads are an independent variable, whose main effect on consumer acceptance can be influenced by the mediator, namely privacy concerns. The influence of AI (vs. Human) enabled ads on privacy concerns can be influenced by the moderator, namely the Intrusiveness.

3.1 AI (VS HUMAN) – ENABLED ADS

Consumers have more and more access to all the information they need to make their purchase decisions, allowing the comparison of products or services and prices, to acquire the most appropriate solution (Kumar et al., 2019). Thus, there is a need for companies customize their marketing communications, as the differentiation of products or services is no longer enough to capture the attention of consumers (Kotler, 2021).

Personalization consists of segmenting content related to products or services based on the needs and interests of each specific customer (Ameen et al., 2021; Chen et al., 2022). Personalized ads allow for delivering relevant and targeted content to consumers (Krafft et al., 2017), based on consumer insights collected, increasing the efficiency of the presented

content (Antonio et al., 2022; Deng et al., 2019) and ceasing to contact consumers as generically as was previously done (Oliveira & Pessoa, 2021).

To produce personalized advertisements, there is a need to know the entire customer journey, that is, all touch points of contact between the customer and the company (Rodgers & Nguyen, 2022), and to understand their preferences (Ameen et al., 2021; Antonio et al., 2022; Oliveira & Pessoa, 2021), to deliver the most suitable content for each client specifically and improve the client's journey, mainly the research information stage (Deng et al., 2019; Moura & Reis, 2021; Rodgers & Nguyen, 2022). However, the biggest challenge for companies is to be able to customize without exaggerating and end up affecting the privacy of consumers, due to the excessive use of their data (Aguirre et al., 2015; Zhu & Chang, 2016). In this way, the importance of perceiving which level of personalization is considered beneficial by consumers is highlighted, so that ads appear as an aid in the online experience and do not become intrusive.

Nowadays, personalized ads can be developed using two main methods, Artificial Intelligence or created by humans, having both advantages and disadvantages. The use of AI technologies allows the collection and process of consumer data, to segment consumers and adapt the content of advertisements in real-time to their needs (Ameen et al., 2021; Kumar et al., 2019; Corrêa, 2019; Yu, 2022), such as by combining data from past customer behaviors from multiple sources. AI techniques learn from this data and predict which will be the best product or service to advertise (Kietzmann et al., 2018), to ensure consumer satisfaction and contribute to brand loyalty (Zhu & Chang, 2016). In this way, Davenport et al (2020) and Longoni et al. (2019) believes that AI can outperform human capabilities, being more accurate at predicting what consumers want.

However, consumers continue to seek human interaction, which is a challenge for the acceptance of new technologies (Kotler, 2021), as they feel less connected with the companies when they use AI (Gerdman et al., 2017), considering that artificial intelligence is less empathic than humans (Longoni et al., 2019). Some authors consider that consumers prefer to follow the suggestions made by humans than AI and for this reason, many clients when exposed to ads developed through AI, end up ignoring them.

This way, people seek to have human contact during their journey because although AI has a constant learning capacity, it is a machine, and it will never fully understand what is behind consumer attitudes (Larva, 2021), sometimes ending up not meeting what the consumer was really looking for, demonstrating that human relations are essential (Kotler, 2021). This is

where human-developed personalized ads come in. Ads developed by humans are more sensitive to consumer needs, as humans have a greater ability to understand each customer (Deng et al., 2019), being this one of the reasons why consumers may prefer human-tailored ads over AI-enabled ads, as they allow for more authentic experience.

Previous studies (Gomes, 2022; Puntoni et al., 2021; Ribeiro, 2021) show that many consumers prefer to be exposed to advertisements made by humans as they consider that the appearance of new technologies has stolen many jobs, by replacing humans with AI tools, and consider that by accepting the use of Artificial Intelligence, they are contributing to unemployment, which can reduce AI-enabled ads acceptance. However, some authors argue that artificial intelligence is rapidly being accepted by everyone (Vieira & Magano, 2021), due to the convenience it offers.

AI-enabled ads have some limitations because if there is a restriction made by consumers and it is not possible to access their personal data (Gerdman et al., 2017), the AI tools end up not having enough information to learn, and, consequently, are unable to develop proper ads targeted to consumers. While humans find it easier to understand people's needs, because even without a lot of information, they manage to put themselves in the customer's shoes and identify possible services or products that will satisfy their needs, thus developing targeted advertisements for the customers. Nevertheless, human resources represent higher costs for companies and are limited (Kotler, 2021), ending up with little time to spare for the creative development of advertisements, making the ads created by them sometimes fall short of consumer expectations, failing to satisfy consumer needs completely. In this way, according to Kotler (2021), AI and humans should be complementary, since the automation conferred by artificial intelligence together with the understanding of the consumer from humans, would allow companies to offer a better experience to their consumers, by making ads more efficient.

Therefore, it is important to understand what type of advertisements customers prefer so that it is seen as a personalization made specifically for each client. The following hypothesis has been proposed:

H1: AI (vs Human)-enabled ads influence the acceptance of personalized advertisements. Consumers who are exposed to AI (vs Human)-enabled ads have lower acceptance of personalized ads.

3.2 PRIVACY CONCERNS

Consumers have been expressing great concern regarding the use of their data by companies to create personalized communications (Larva, 2021; Yu, 2022). Such concern may result in a reduction of consumer interaction with companies, as they consider that brands have too much knowledge about their behaviors and needs (Corrêa, 2019) and may decide not to choose the suggested product to demonstrate control over their decisions (Davenport et al., 2020).

Often the feeling of invasion of privacy is because many companies fail to communicate about how they collect customer data, as it is believed that consumers who see their data being used without their consent have a greater propensity to see personalized advertisements as an invasion of privacy and develop defensive attitudes, such as refusing access to data or providing incorrect information (Krafft et al., 2017), to protect their data against risks that may arise (Wang et al., 2022; Yu, 2022).

The GRPD law came into force to provide to the consumers control over their data (Krafft et al., 2017), implementing the necessity for companies to have the explicit and mandatory consent of consumers for the use of their data, to prevent companies from making excessive use of the personal data of customers without their knowledge, limiting the companies marketing strategies and emphasizing the importance of transparency in data collection (Ahmad et al., 2015) and the mandatory development of a privacy policy, which clearly informs how customer data is used, giving consumers the possibility to accept or not share their information. However, the possibility of consumers refusing access to their data is a challenge for companies, as without these, companies cannot target ads developed specifically for them (Rosa, 2021). However, Puntoni et al (2021) considers that the need for explicit consent for the use of customer data can lead to consumers feeling overwhelmed with the decisions they have to make and not feeling that they have more control over their personal data, which could lead to them preferring not to share their data.

Several authors (Aguirre et al., 2015; Wang et al., 2022) consider that the consumers who are informed about how their data will be collected, analyzed, and used, feel less vulnerable when exposed to advertisements based on their information, as the decision to share the data was taken by themselves, not feeling deceived.

In this way, knowledge is a factor that influences concerns about data privacy, in the sense that consumers who are more aware of the existing privacy policies to protect their data and

how their data will be used end up being less concerned about the invasion of their personal data and more willing to provide their data (Puntoni et al., 2021), while consumers with little or no knowledge of existing regulations are highly concerned about limiting access to their data (Ribeiro, 2021; Antonio et al., 2022). However, some studies reinforce the opposite, that consumers who have less knowledge about how their data is collected end up not feeling so uncomfortable with personalized ads (Rosa, 2021), thus being a topic that should also be studied in more depth. However, consumers who appreciate the presentation of personalized advertisements based on their data are less sensitive to loss of control and use of their data by third parties (Ameen et al., 2021).

All the information presented highlights the existing paradox between data privacy and personalization (Xu et al., 2011; Zhu & Chang, 2016), as consumers can appreciate personalization or consider it an invasion of privacy (Wang et al., 2022), considering that a high level of personalization can lead to increased concerns about privacy (Krafft et al., 2017).

Therefore, privacy concerns were incorporated into the model as a mediator, as it is responsible for mediating the main relation between AI (vs. Human) enabled ads in consumer acceptance, as the main relation is due to the existence of Privacy Concerns. In this sense, the study seeks to observe if consumers will have higher privacy concerns, and consequently, have lower acceptance or if consumers, when exposed to AI (vs. Human) enabled ads, have fewer privacy concerns, as they value the advertisement presented, resulting in greater acceptance. Having developed the hypothesis presented below:

H2: Privacy Concerns mediates the relationship between AI (vs. Human) on consumer acceptance. Consumers will have higher privacy concerns, and consequently, have lower acceptance of AI-enabled ads.

3.3 INTRUSIVENESS

Intrusiveness consists of interrupting the customer journey, without being asked by consumers (Li et al., 2013), thus being considered one of the factors that negatively influence the consumer's acceptance.

AI (vs Human)-enabled ads, can be considered intrusive when created based on personal data extracted without their consent (Aguirre et al., 2015), due to the excess of personalization or due to daily exposure to advertisements, leading the consumer to feel overwhelmed (Kumar et al., 2019). The ad intrusiveness can cause consumer dissatisfaction, which may develop

negative attitudes towards those responsible for such bombardments, such as ad blindness (Larva, 2021) or denying permission to access their personal data (Deng et al., 2019; Gerdman et al., 2017; Krafft et al., 2017; Li et al., 2002; Wang et al., 2022). An example of an advertisement considered intrusive would be the appearance of advertisements based on the consumer's past interests, such as the consumer has stopped consuming alcoholic beverages and receiving advertisements about alcoholic beverages. In the face of this, the consumer can feel misunderstood when presented with and ad that does not fit his profile (Puntoni et al., 2021).

In terms of acceptance of online personalized display ads, trust and content relevance play a significant role in consumer perception and interaction with the brand throughout the customer journey (Antonio et al., 2022), which is considered by many authors to be the keys to developing a positive opinion regarding AI adoption (Ameen et al., 2021). Trust is an emotional state composed of positive expectations regarding the intention of others (Aguirre et al., 2015; Ahmad et al., 2015), and content relevance is seen as a benefit of personalization for consumers (Krafft et al., 2017) to reward permission to access their personal data.

Relevant content can reduce the intrusiveness of personalized ads felt by customers if it meets what consumers desire (Chen et al., 2022; Krafft et al., 2017) and contributes to increase trust, which is considered a moderating effect of intrusiveness (Li et al., 2013). However, to respond to the objectives of the present study, only intrusiveness is considered as a moderator in the model presented above.

Intrusiveness is incorporated into the model as a moderator, as it can positively or negatively influence privacy concerns. Past studies show that if a personalized ad is seen by consumers as intrusive, it negatively affects privacy concerns, preferring not to share their data, and are more likely to ignore communications directed by the companies in question (Antonio et al., 2022). On the contrary, consumers who see ads as less intrusive, reduce the feeling of loss of control and are more willing to interact with them (Ahmad et al., 2015).

In this way, it is possible to understand that the perception of consumers about the intrusiveness in online advertising directly influences the attitudes that will be taken toward them (Ahmad et al., 2015). Having developed the hypothesis presented below:

H3: Intrusiveness will moderate the influence of AI (vs. Human) enabled ads on privacy concerns. High levels of intrusiveness raises high privacy concerns.

4. METHODOLOGICAL APPROACH

To answer the research questions proposed by the study and considering the literature review conducted previously, a conclusive analysis will be conducted through two experimental studies. The pilot study is a lab experiment using neurophysilogical tools, namely, eye tracking and the first study is a online experiment. In the two studies the participants are randomnly assigned to one of the experimental condition (Assistant type: Human vs AI). This methodology will allow gathering the necessary information to understand consumer perceptions about the use of AI (vs Human) in online advertising along the customer journey.

4.1 PILOT STUDY : AI (VS HUMAN) CONSUMER ATTENTION

In pilot study, an lab experiment was developed, using a neurophysilogical tool, namely Eye tracking (Hjelm & Suhonen, 2021). The eye-tracking approach was one of the chosen methods because it allows a completer collection of data and is more difficult to manipulate (Ferreira,2021), allowing to see where the participants are looking during the experiment (Tobii, n.d).

Before conducting study 1, in which people's opinions regarding advertising developed by Artificial Intelligence vs designer assistant will be collected, pilot study is focused on gathering detailed insights into how people react seeing AI (vs Human) advertising. This way, the participants were randomly assigned to one of the two conditions (Assistant type: AI vs Human).

The objective is to understand where they focus their visual attention, for example, if the participants look at the advertisement, if they look to the copy or description of the advertising presented, and whether it varies depending on the advertisement, such as not paying attention to what is described, or if, when seeing who developed the advertisement, they choose not to pay more attention, to verify whether the type of assistant influences the attention of consumers.

To collect relevant insights about consumer's perception of personalized ads, an area of interest was created on the ad description, responsible for informing participants about the assistant that developed the ad.

4.1.1 Experimental Procedure

Two timelines were created for the study of neuromarketing (Appendix A), to expose each participant to a different hypothetical scenario that they may encounter in their daily life. The timelines are divided into three stages, a moment for the software calibration used, observation

of the advertising and finally, a questionnaire, to obtain more complete results. For the study in question, two advertisements were developed (Assistant type: AI vs Human), with the title, a hamburger image, description and graphic elements that alude to the ingredients of hamburger, with the same visual appearance in both scenarios to not influence the perception of the participants, with the exception of the description presented at the bottom of the advertisements, identifying the assistant responsible for creating the ad.

The study consist of placing the participants in front of a portable computer, using the Tobii Pro Lab software (x64) and the visual attention of the participants and the respective actions will be recorded using the Tobii Pro Fusion Screen-based Eye tracker (Tobii (n.d)), responsible for recording eye movements, with the participant's due authorization, allowing to perceive where the participant fixed the look and the duration of the look.

The study began with the calibration process, to validate the adequacy of the distance and position of the participants. In the calibration, participants are asked to follow the point that is displayed on the screen with their eyes, so that the software adjusts to track eye movements. In this way, the records considered in the study have a gaze sample equal or greater than 65%, guaranteeing the correct performance of the study.

Afterwards, are given to the participants a brief introduction about the ad they will be exposed to and are asked to observe it carefully. Then, the participants are exposed to the ad of one of the experimental conditions (Assistant type: AI vs Human) and will be identified the eye movements that the participants will present, with the aim of measuring the participants visual attention to the designer responsible for developing the ad and realizing which of the designers has the greatest capacity to capture participants attention. Finally, participants proceed directly to completing the questionnaire regarding the ad previously observed through qualitrics platform based on previous studies. (Garvey et al., 2022; Krafft et al., 2017; Merisavo et al., 2007; Zhao & Zhao, 2016), using the following measurement scales (Table 2):

Construct	Items	Measurement items	Source
Knowledge Level (KL)	KL1	KL1. Which of the following statement better describes your knowledge about Artificial Intelligence (AI)	Adapted from Huisman et al., 2021
Intrusiveness Perception (IP)	IP1	IP1. I think the ad is worthless to my purchase decision-making	Adapted from Wang et al., 2022
	IP2	IP2. I considered that the information in the ad are not reliable	
	IP3	IP3. I considered that the ad would interfere with my choices	
	IP4	IP4. I feel pressured by the ad presented	
	IP5	IP5. I consciously ignore ads like the one shown above	

	IP6	IP6. I think personalized ads to be… Helfull...distracting....intrusive....	
Privacy Concerns (PC)	PC1	PC1. I am concerned about the excessive collection of my personal data for the development of ads like the one shown	Adapted from Krafft et al., 2017
	PC2	PC2. I am concerned that the companies share my data with third parties	
	PC3	PC3. I am concerned about the loss of control of my personal data	
	PC4	PC4. I considered that my personal data can be misused	
	PC5	PC5. I consider that the personalized ad showed invaded my privacy	
Consumer Acceptance (CA)	CA1	CA1. I feel positively about the ad presented	Adapted from Merisavo, Kajalo, Karjaluoto et al., 2007
	CA2	CA2. I am willing to receive ads like the one showed in the future	
	CA3	CA3. I would see all the online display ads I receive in the future	
Manipulation Check	MC1	MC1. The ad that you saw was developed by: 1.AI Assistant to 9.Designer Assistant	Adapted from Garvey, Kim, Duhachek, 2022
Demographic	D1	D1. What is your age ?	Adapted from Ahmad et al., 2015
	D2	D2. What is your gender ?	
	D3	D3. What are your educational qualifications ?	

Table 2 - Lab experiment Measurement Items

This way, will be possible to conclude the different reactions of the participants when expose to a AI or designer assistant enabled personalized advertising, allowing to understand what type of ad is capable of capturing the participants attention and create a positive reaction to the ad.

4.1.2 Data Collection and Respondents Selection

As pre-registrated in the Aspredicted platform (study AsPredicted #131920), the study took place at the NOVA IMS facilities, during post-labor hours, using the Tobii Pro Fusion Screen-Based Eye tracker (Tobii (n.d)) and thirty participants, majority among the Nova Ims University students, were asked to participant to be statistically relevant and to be able to conclude the existence differences in the visual attention of the participants when exposed to designer assistant generated advertisements and Robot enabled ads.

4.2 STUDY 1: AI (VS HUMAN) CONSUMER PERCEPTION

Study 1, an online questionnaire, was conducted to understand how AI (vs Human) assistant influence the consumer perception of personalized advertising along the customer journey, whether they appreciate it or whether they consider it intrusive and avoid the ads. This study tests the moderator of Intrusiveness between AI (vs Human) ads and privacy concerns, and also tests the mediator factor of privacy concerns between the independent variable, AI (vs Human) enabled ads, and the dependent variable, consumer acceptance.

This approach was chosen as a methodology, because it is one of the most used methodologies in the collection of quantitative primary data and allows reaching a high number of participants (Chap, C., 2022).

Thus, this section includes the experimental procedure, measurement scales, respondents selection, and data collection.

4.2.1 Experimental Procedure

The questionnaire consists of three parts: a brief explanation of the survey, the informed consent form, and the questionnaire itself. To begin with, a brief description of the subject under study is presented, and what is intended to be understood through the questionnaire, namely the consumer's acceptance of AI (vs. Human) enabled ads throughout the customer journey and under what circumstances this perception changes. The customers are informed that the answers will be anonymous and analyzed only for academic purposes and will not be shared with others, allowing participating voluntarily or rejecting.

Then, with the main objective of protecting the participants, some ethical considerations were included in the construction of the informed consent form, which must be read carefully by all respondents before starting the questionnaire (Hjelm & Suhonen, 2021). Afterwards, respondents answer a filtering question "Do you use internet to search and/or purchase products or services ?". For participants who answer "No", the questionnaire end, otherwise ("Yes" answer), respondents were able to continue filling out the questionnaire.

After the filtering question, the questionnaire is composed with more five sections. The first section contains a question about the level of knowledge of the respondents regarding Artificial Intelligence. Next, after respondents read the brief description of the study, accept the informed consent, pass the filtering question and rank the AI knowledge, respondents will be randomly assigned to one of the defined conditions (Assistant Type: AI vs Human). In the designer assistant condition, a brief explanation of the effort made by a team of designer assistants to

develop ads that would meet people tastes is presented. In the case of the AI assistant condition, it mentions the use of an AI tool to create personalized advertisements that improve customer experiences. However, the displayed ad is the same in both conditions (Figure 2), with the aim of the visual appearence don't influence the responses to the items presented afterwards.

Figure 2 - AI (vs Human) enabled ads

The third section refers to the analysis of the respondents perception. In both conditions, the perception of intrusiveness, privacy concerns and consumer acceptance of advertising like the one showned in the previous section will be measured. The fourth section refers to the manipulation check, to measure the number of respondents who understood that the ad was developed by a designer assistant or Artificial Intelligence assistant. The seven and last section is composed of questions about the demographics of the participants, namely age, level of education and gender.

4.2.2 Measurement Scales

In this study, all the questions will be measured using a Likert Scale, a nine-point scale ranging from Strongly Disagree (1) to Strongly Agree (9), allowing respondents to rate how much they agree with a statement (Chap, C., 2022).

The measurement scales are divided into five constructs with multiple items (Table 3). The developed items were adapted from previous studies. Firstly, in the Intrusiveness Perception, the opinion of portuguese consumers regarding the use of Artificial Intelligence or designer assistant generated ads will be measured through the level of agreement with the five items presented (Adapted from Wang et al., 2022). Regarding, privacy concerns, five items will be

rated on a nine-point scale adapted from Krafft et al. (2017) (e.g., “Concerned about the collection and excessive use of my personal data”). The Merisavo (2007) scales were adapted and used to measure consumer acceptance, including three items: “I feel positively about the ad presented”. Then, the manipulation check was made by the rating given to the following question: “Do you consider that the presented ad was developed by Humans or Artificial Intelligence?” (1=Artificial Intelligence to 9=Human) (Adapted from Garvey et al., 2022). Lastly, the Demographics were assessed through three items adapted from other research such as “What is your age ?” (Adapted from Ahmad et al., 2015).

Construct	Items	Measurement items	Source
Filter (F)	F1	F1. Do you use internet to search and/or purchase products or services	Adapted from Zhao, Y., Zhao, D., 2016
Knowledge Level (KL)	KL1	KL1. Which of the following statement better describes your knowledge about Artificial Intelligence (AI)	Adapted from Huisman et al., 2021
Intrusiveness Perception (IP)	IP1	IP1. I think the ad is worthless to my purchase decision-making	Adapted from Wang et al., 2022
	IP2	IP2. I considered that the information in the ad are not reliable	
	IP3	IP3. I considered that the ad would interfere with my choices	
	IP4	IP4. I feel pressured by the ad presented	
	IP5	IP5. I consciously ignore ads like the one shown above	
Privacy Concerns (PC)	PC1	PC1. I am concerned about the excessive collection of my personal data for the development of ads like the one shown	Adapted from Krafft et al., 2017
	PC2	PC2. I am concerned that the companies share my data with third parties	
	PC3	PC3. I am concerned about the loss of control of my personal data	
	PC4	PC4. I considered that my personal data can be misused	
	PC5	PC5. I consider that the personalized ad showed invaded my privacy	
Consumer Acceptance (CA)	CA1	CA1. I feel positively about the ad presented	Adapted from Merisavo, Kajalo, Karjaluoto et al., 2007
	CA2	CA2. I am willing to receive ads like the one showed in the future	
	CA3	CA3. I would see all the online display ads I receive in the future	

Manipulation Check	MC1	MC1. The ad that you saw was developed by: 1.AI Assistant to 9.Designer Assistant	Adapted from Garvey, Kim, Duhachek, 2022
Demographic	D1	D1. What is your age ?	Adapted from Ahmad et al., 2015
	D2	D2. What is your gender ?	
	D3	D3. What are your educational qualifications ?	

Table 3 - Online Experiment Measurement Items

4.2.3 Respondents Selection

The data was collected from participants living in Portugal, who use the internet during their customer journey, ensuring that the perceptions of real customers are gathered. The focus in Portugal is due to the lack of research literature about the use of AI in Advertising in Portugal and the increase in the use of AI in Marketing by Portuguese companies in recent years.

In 2022, 43% of Portuguese consumers use the internet to search for products and services before making their purchase decision (Jornal Económico, 2021). In this way, the questionnaire will be sent to people aged between 18 and 55 years, considering that ages of 16 to 24 years (100%), 25 to 34 (99%), 35 to 44 (97,2%) and 45 to 54 years old (91,2%) are age groups with the highest percentage of customers using the internet during their journey (PORDATA, 2022). Such results justify the use of this age range, as this age group allows a greater number of participants to pass the filter question “Do you use internet to search and/or purchase products or services?”, allowing better results.

4.2.4 Data Collection

The online experiment was built using Qualtrics. Initially, a pre-test was conducted, to test the questions, and verify the existence of errors and possible improvements, being sent to a sample of thirty participants, composed of university students, professors, and family members.

The respondents highlighted the need to adjust the scale used to present numbers or a description at each point, as many of the respondents considered that the fact that there was no description in the intermediate points was due to a formatting error in the mobile format. Subsequently, some of the respondents suggested changing the layout of the questionnaire, as when selecting a certain degree of agreement it was underlined in red, giving the

participants the feeling that the select answer was wrong. Finally, some respondents mentioned the fact that not all people are aware of the meaning of the customer journey at the marketing level, and may not be able to answer the filtering question in the intended way.

According to pre-registration on the Aspredicted platform, the online experiment would be sent to a minimum of one hundred respondents per experimental condition, randomly assigned. To collect viable results, the experience was based on previous studies (Ahmad et al., 2015; Garvey et al., 2022; Krafft et al., 2017; Merisavo et al., 2007; Oliveira & Pessoa, 2021; Wang et al., 2022) and whose questions were sent through the Qualitrics platform until a statistically relevant sample was reached (study AsPredicted #122506) to be able to conclude the existence or not of differences in the opinions of the respondents who are exposed to Designer Assistant generated advertisements and AI Assistant enabled ads, in the face of intrusiveness, Privacy Concerns and consequently Consumer Acceptance.

5. RESULTS AND DISCUSSION

5.1 PILOT STUDY : AI (VS HUMAN) CONSUMER ATTENTION

The Lab experiment records were collected in the May 17th and May 30th with Tobii Pro screen-based eye tracker, having collected data from thirty five participants. However, five participants had their record with a gaze sample lower than 65% and for that reason the records had to be excluded from the study, leaving only thirty records, fifteen participants per condition.

In the study, six different eye-tracking metrics were taking into consideration to study the area of interest (AOI):

1. Total fixation Duration: Total time of fixations on the AOI
2. Average Fixation Duration: Average time of fixation on the AOI
3. Fixation Count: Number of fixation on the AOI
4. Time to First Fixation: Time taken until first fixation in the AOI
5. Fist Fixation Duration: Time of first fixation on AOI
6. Visit Count: Number of ad visualizations

5.1.1 Respondents Profile

In the present study, 70% are women, and the rest, 30% are men. The average age of the survey respondents is 23, with the highest percentage being 22 and 24 (23,3%). Regarding the educational level, most respondents have Bachelor degree, equivalent to 63%. Considering the AI Knowledge, 43% of the participants heard about Artificial Intelligence and 43% have knowledge of AI, only 3% choose active AI development.

With the help of SPSS, through the data collected in the questionnaire, the following results were obtained (Table 4):

Profile Questions	Results (%)	
Age	18-24	90%
	25-34	7%
	35-44	0%
	45-55	3%
Gender	Male	30%
	Female	70%
	Non-binary/third	0%

Educational Level	High School	7%
	Bachelor's Degree	63%
	Masters Degree	20%
	Post-Graduate Degree	3%
	Middle School	7%
	Elementary School	0%
	Prefer not to say	0%
Which of the following statement better describes your knowledge about Artificial Intelligence (AI) ?	Never heard of AI	0%
	Heard of AI	43%
	knowledge of AI	43%
	High Knowledge of AI	10%
	Active AI Development	3%

Table 4 - Respondents profile

5.1.2 Visual Attention Measures

The experiment aimed to study consumer's perception of the use of AI in personalized ads during their customer journey. For this reason, to achieve the objective, Heat maps, gaze plots and area of interest (AOI) were developed to study the gaze points of the participants when exposed to personalized ads developed by AI in comparison to the Human generated ads, to better understand the consumer behavior towards AI customized ads.

Gaze plot and heat Map

Through the records available in the Tobii software and the developed gaze plots (Figure 3), it was possible to verify that in both timelines, the gaze of the majority of participants is directed first to the product itself in the center of the ad, the hamburger, then to the title and finally for the description. However, the reading of the ad varies depending on each participant, they vary from reading from bottom to top or zig zag.

Figure 3 - Visual Attention Gaze Plots (AI vs Human)

As mentioned earlier, in the study thirty participants were asked to watch the advertisement (AI vs Human). Through Tobii Pro it was possible to develop a heat map composed by the participant records (Figure 4), showing different colors depending on the fixation time. The analysis of the heat map of each timeline made it possible to see variations in the fixations in the present scenarios.

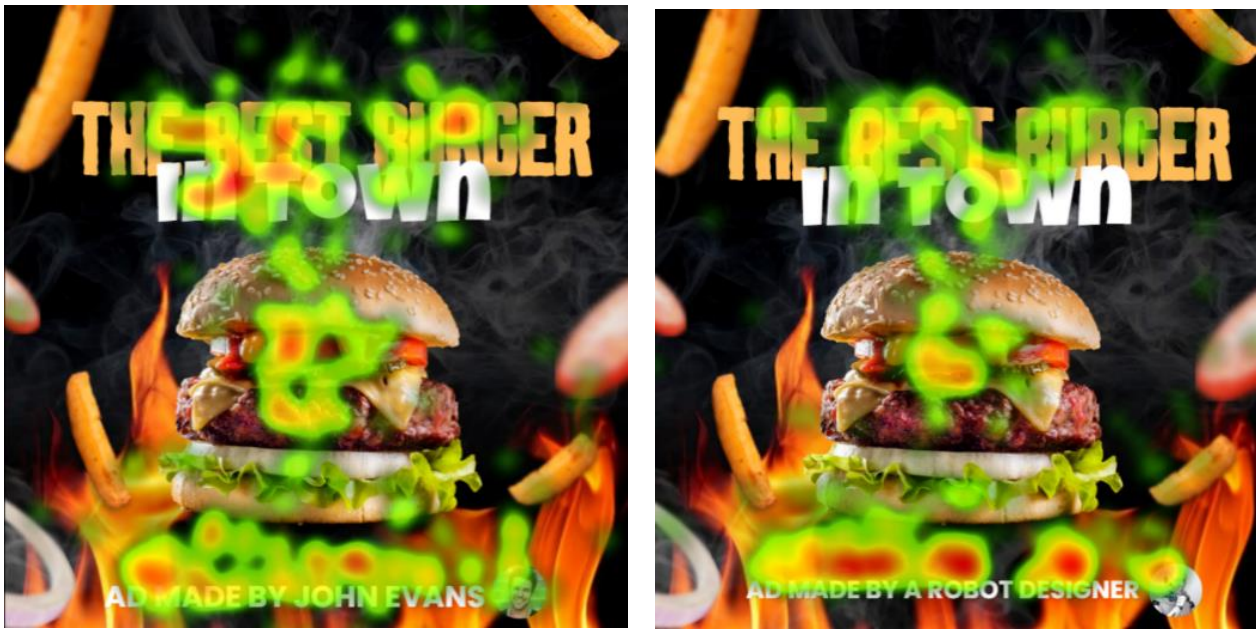

Figure 4 - Visual Attention Heat Maps (AI vs Human)

In the case of the AI advertisement, the heat map concluded that the participants in this condition paid more attention to the description of the ad, while in the case of the human assistant scenario, the fixation of the participants was made mostly on the title and the product, as have a larger orange area, and slightly less attention to the description of the ad and the respective image of the assistant, which demonstrates that in advertisements developed by humans, the advertising message captures more attention. In both scenarios, most participants did not look at the other elements present in the ad, namely the ingredients surrounding the hamburger. However, in the robot scenario, there was a greater number of participants who looked at the surrounding elements, although in a superficial way.

The results showed that the fact that the ad is developed by a robot captures more attention and the advertising message when the ad is developed by a human has an influence on the eye movements. However, eight participants did not look at the area of interest at all, four from each scenario, which demonstrates that they did not pay enough attention to the ad or that the person who made the ad is not relevant to them.

Process Time

To gain greater knowledge of consumer's perceptions, the time taken to complete the entire process was analyzed for each of the timelines. The study time consider the total process time, including calibration, followed by viewing the ad and finally the response time to the questionnaire.

In the case of participants exposed to human ads (Figure 5), it took an average of 4:42 minutes to complete the entire process, the longest participant finished the process in 7:54 minutes. Since most participants (60%) took between 4 and 6 minutes.

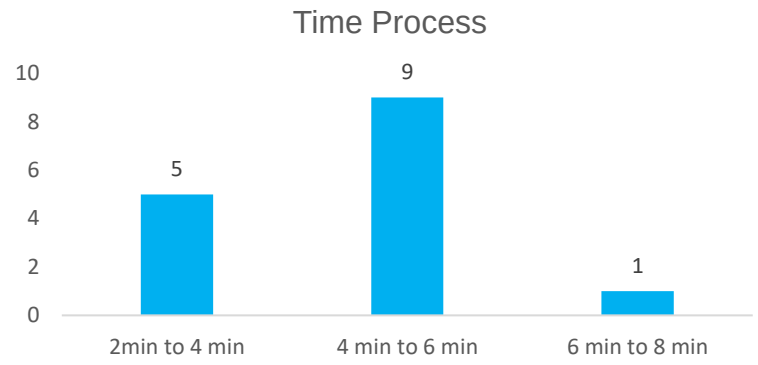

Figure 5 - Human Scenario Time process

In the robot scenario (Figure 6), participants took an average of 5 minutes to complete the study, with the the longest participant finishing in 6:27 minutes. Most participants (80%) took between 4 and 6 minutes.

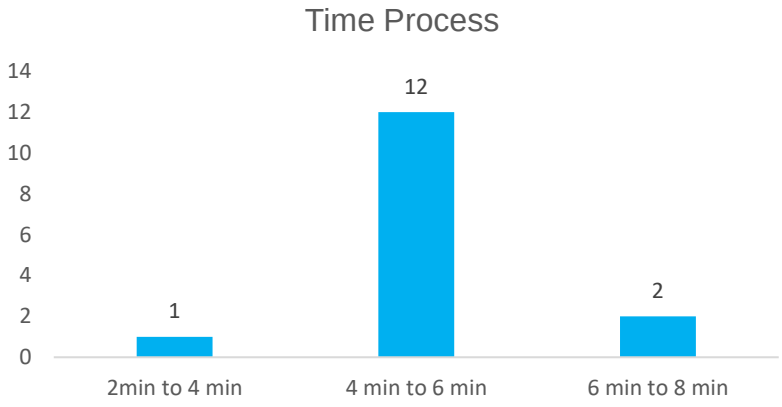

Figure 6 - AI Scenario Time Process

The results show that participants exposed to the ad developed by a robot took longer on average to complete the process, allowing us to conclude that this scenario was able to capture more attention from participants.

5.1.3 Independence T-test

As previously mentioned, to analyze relevant areas of the ads, two areas of interest (AOI) were created on Tobii Pro Lab software, namely a boundary in the ad description that specifies whether it was developed by a human or robot in both ads (Figure 7), with the objective of understanding the difference in the attention deposited by the participants in each scenario.

Figure 7 - Area of Interest (AI Vs Human)

After creating the area of interest, the metrics collected in Tobii software were analyzed using SPSS, and an Independence Sample T-Test was performed, considering the total fixation duration, average fixation duration, fixation count, time to first fixation, first fixation duration and visit count as test variables and the independent variable (Assistant: AI vs Human) as grouping variable, thus allowing to compare the test variables according to the type of assistant.

The superficial analysis of the collected results allowed to reinforce the fact that four participants in each of the scenarios (eight in total) did not focus their attention on the description, which led to the exclusion of their records from the analysis, which resulted in only twenty-two participant records being considered, eleven for each condition, being bellow the intended for the study, making it not possible to generalize the results obtained.

The results collected during the eyetracking study allowed us to verify slight changes in the attention deposited by the participants in both scenarios. Regarding the “Total Fixation Duration”, on average, participants exposed to the Robot advertising spent more time looking at the advertising description (MAI = 2.09; SD= 1.37; t(20)=0.84, p=0.21) about 40000 miliseconds longer than in the human scenario (Mhuman=1.69; SD=0.76; t(20)=0.84, p=0.21). However, the “Average fixation duration” does not show significant diferences in each scenario, with both having na average of approximately 0.3.

In terms of fixation count, it was possible to see that the participants exposed to the robot advertisement had, on average a greater number of fixations (MAI = 7.72; SD= 4.61; t(20)=-.39, p=0.20) than those exposed to the Human ad (MHuman = 6.27; SD= 3.17; t(20)=-.39, p=0.20) and had a lower time to first fixation (MAI = 1.42; SD= 0.98; t(20)=-2.24, p<0,05) than human scenario (MHuman = 2.52; SD= 1.30; t(20)=-2.24, p<0,05) as presented in the metric visualization showned below (Figure 8):

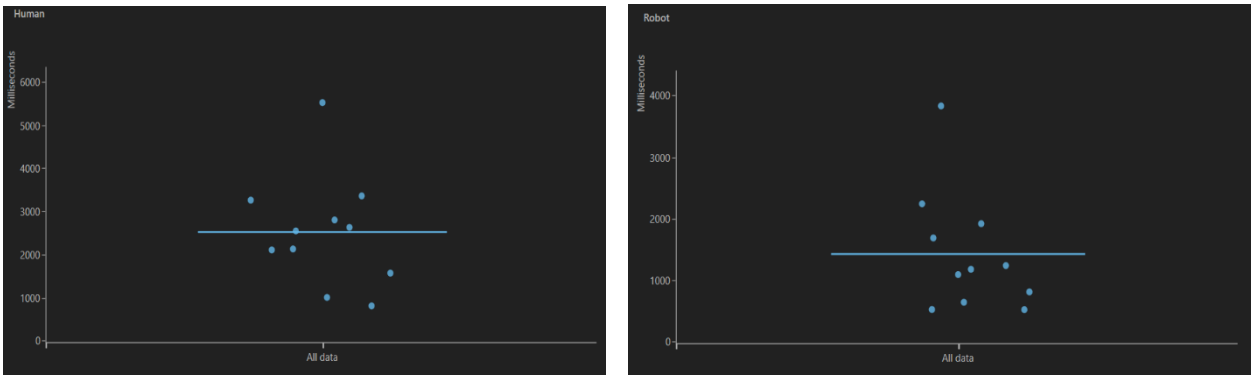

Figure 8 – Time to first fixation (Tobii metrics visualization)

The results show that the Robot ad was able to capture the participants attention more quickly to the AOI and that they were more curious about the assistant who developed the ad, because this scenario show higher count of fixations, the reason behind this fact may be due to the robot image on the description, as it is not a person, attracts more attention, because is different from what is expected. Another reason behind the greater total fixation duration could be that participants considered that the description “made by a robot” is related to the hamburger, that is, they did not visualize the “ad” part and considered that the hamburger is what was made by a robot and not the ad itself, arousing more curiosity about the advertising. However, first fixation duration is higher in the case of human ad (MHuman = 0.35; SD=0.29; t(20)=-.92, p=0.18), which may demonstrate that although the robot ad captures more attention at first glance, participants exposed to the human ad spent more time looking at the AOI, which may result from the fact that the description present the name and a photo of a person, which can mean a greater acceptance of personalized ads in ads developed by human assistants.

Finally, regarding the Visit, the robot advertisement had a total visit count higher (MAI =2.45; SD= 1.37; t(20)=1.42, p=0.09)

		Levene's Test for Equality of variances		T-Test for Equality of Means		
		Z	Sig.	t	df	Unilateral p
Total Fixation Duration	Equal variances assumed	4,262	0,052	0,841	20	0,205
	Equal variances not assumed			0,841	15,651	0,207
Average Fixation Duration	Equal variances assumed	1,063	0,315	-0,392	20	0,35
	Equal variances not assumed			-0,392	18,697	0,35
Fixation Count	Equal variances assumed	2,657	0,119	0,863	20	0,199
	Equal variances not assumed			0,863	17,722	0,2
Time to First Fixation	Equal variances assumed	0,321	0,577	-2,238	20	0,018
	Equal variances not assumed			-2,238	18,614	0,019
First Fixation Duration	Equal variances assumed	1,513	0,233	-0,92	20	0,184
	Equal variances not assumed			-0,92	14,805	0,186
Visit Count	Equal variances assumed	0,199	0,66	1,419	20	0,086
	Equal variances not assumed			1,419	18,393	0,086

Table 5 - T-test Independence Eye-tracking metrics

As presented in the table above (Table 5), the parameter Time to first fixation is the only one that presents a significant value for the study in question (p<0,05). The results show a negative correlation between the time to first fixation and the AOI, which means that the shorter the time until the first fixation, the more quickly the area of interest capture attention, which may mean greater interest of participants in advertisements developed by AI.

The questionnaire conducted in the lab experiment to collect insights about the consumer perception of the ad presented in relation to the level of intrusiveness, privacy concerns and consumer acceptance had insignificant results, and for that reason was excluded of the pilot

study. For the collection of more relevant insights were conducted the study 1, that collected responses from a more significant sample.

5.1.4 Discussion

The study seeks to explore the participants visual attention when exposed to ads developed by AI vs Human through the visualization of heat maps and gaze plots, allowing to conclude that in the case of ads made by AI, the description of the ad had a high number of fixations, such is due to the presence of an image of a robot, which can be considered a distracting fator from the product itself. However, in the human scenario, there was a greater fixation on the title, which shows that the advertising message has an influence on the consumers perception, as it is the factor that has the greatest capacity to draw attention, however the description has less fixations, demonstrating that the fact that the ad was made by human is something that is not so relevant, as it is the type of ads usually seen.

The analysis of the area of interest (AOI) through six eye-tracking parameters with the SPSS software help it was possible to verify that the advertisement made by a robot captures attention more quickly, presenting a shorter time to first fixation, as mentioned above, is due to the fact that it presents the image of a robot. However, in the human scenario, the description was seen for a longer time, which demonstrates that the presentation of the name and image of the responsible person attracts greater interest.

This way, it is concluded that the presentation and type of assistant responsible for developing the ad presented during the customer's journey influences the perception of consumers, as participants show differences in the visual attention depending on the ad observed, which demonstrates that the presentation that the ad was made by a robot can lead to greater curiosity and consequently lead to higher probability of accepting it.

5.2 STUDY 1: AI (VS HUMAN) CONSUMER PERCEPTION

The experimental design data were collected from March 18th to April 20th, obtaining three hundred twenty-six responses. However, due to a high number of responses collected being incomplete (seventy-nine responses), when answering "No" in the filter question or not accepting the informed consent form, and one hundred forty-seven respondents didn't pass the manipulation check, it led to the exclusion of two hundred twenty-six responses, not being possíble to reach the minimum of one hundred respondents per condition as defined on Aspredicted.

Therefore, it was necessary to use a filter, so that only respondents aged less than or equal to 55 and who had passed the manipulation check (FilterManipulationCheck=1.00) were considered. Having considered that if the respondents has been exposed to the AI condition ([0-4]=1; [5-9]=0 in FilterManipulationCheck) or the Human ([0-5]=0;[6-9]=1).

5.2.1 Respondents Profile

For the final analysis, only one hundred responses were used, of which 57% are women, just 1% is non-binary/third gender and the rest, 42% are men. The average age of the respondents is 33, with the highest percentage being 23 (17%). Regarding the educational level, most respondents have Bachelor degree, equivalent to 39%.

Given the use of the internet during the consumer journey, 100% of respondents use the internet to search for products or services, because this was the filtering question, and 45% of the participants heard about Artificial Intelligence, only 1% still having never heard of AI. Through the Descriptive Statistics (Table 6) to analyze the frequency of items related to demographic and psicographic aspects, the following results were obtained:

Profile Questions	**Results (%)**	
Age	18-24	51%
	25-34	17%
	35-44	9%
	45-55	22%
Gender	Male	42%
	Female	57%
	Non-binary/third gender	1%
Educational Level	High School	29%
	Bachelor's Degree	39%
	Masters Degree	18%
	Post-Graduate Degree	5%
	Middle School	6%
	Elementary School	1%
	Prefer not to say	2%
Do you use internet to search and/or purchase products or services ?	Yes	100%
	No	0%
Which of the following statement better describes your knowledge about Artificial Intelligence (AI) ?	Never heard of AI	1%
	Heard of AI	45%
	knowledge of AI	42%
	High Knowledge of AI	10%
	Active AI Development	2%

Table 6 - Respondents profile (study 1)

5.2.2 Measurement Model

To test the hypotheses and model presented was used the SPSS (Statistical Package for the Social Sciences), a software program used to conduct statistical analyses (IBM, n.d.). The Independence Sample T-Test was conducted to analyze the Main Effect, namely the relation between AI (vs Human)-enabled ads (independent variable) and consumer acceptance (dependent variable).

The moderator and mediator was tested using Hayes Regression, to measure the correlation between this variables. Regression model 7 was used to analyze the mediator and moderator. The mediator will also be tested through model 4. Through the analyzes presented it was possible to accept or reject the three hypotheses developed above. Previously, two general linear univariate models were conducted to explore the existence of significant effects of the independente variable.

5.2.2.1 T-Test Independent Sample (Manipulation Check vs IV) model

An independence T-test (Table 7) was carried out to validate the veracity of the responses collected, to ensure that only responses from participants that understood the manipulation check were considered. The manipulation check variable was placed as a test variable and the independente variable, Assistant (AI vs Human), as the grouping variable.

The results show that, as mentioned previously, it was not possible to reach the one hundred respondents per condition *(MAI = 2.82; p<0,001),* fifty for AI assistant and fifty to the Designer Assistant condition (MHuman =7.52; p<0,001). Thus, it is concluded that the answers used consider only significant answers for the study in question.

		Levene's Test for Equality of variances		T-Test for Equality of Means		
		Z	Sig.	t	df	Unilateral p
Manipulation Check (AI vs Human)	Equal variances assumed	0,622	0,432	-19,959	98	<,001
	Equal variances not assumed			-19,959	97,994	<,001

Table 7 - Independence Sample T-test Manipulation Check

5.2.2.2 T-test Independent Sample (Variable vs IV) model

In SPSS, a second T-test was conducted (Table 8), having as test variables, three new variables, namely PrivacyConcerns2, Intrusiveness2, ConsumerAcceptance2, computed based on the grouping of items presented in the questionnaires referring to these topics. However, through the general linear multivariate model it was possible to verify that the questions [intrusiveness_3], [PrivacyConcerns_2], [PrivacyConcerns_5] and [ConsumerAcceptance_1] are not very significant for the study *(p > 0,05*) and for this reason these four items were not considered in the created variables. The independent variable, assistant (AI vs Human), was used in the t-test as a grouping variable, allowing conclusions to be drawn about the feeling of intrusiveness, privacy concerns and consumer acceptance depending on the condition presented (AIvsHuman).

The results made it possible to verify that the respondents perceive advertisements as less intrusive when developed by AI (*MAI = 4.37; SD= 1.64; t(98)=-1.94, p<0.05),* since most respondents chose the degree of agreement with the items presented referring to intrusiveness below 5 (1=Strongly Disagree, 9=Strongly Agree). Contrary to expectations, they tend to develop greater privacy concerns when exposed to advertisements created by designer assistants *(Mhuman = 6.22; SD= 1.91; t(98)=-1.19, p= 0.12).*

Nevertheless, through the results of the T-test for the analysis of the main Effect between Assistant type (AIvsHuman) and consumer acceptance, it is concluded that consumer acceptance is superior in relation to advertisements developed by AI *(MAI = 4.41; SD=2.00; t(98)=1.20, p= 0.12),* as respondents in this condition have a lower degree of disagreement with the items presented. Considering hypothesis 1, that AI (vs Human)-enabled ads influence the acceptance of personalized advertisements and consumers who are exposed to AI (vs Human)-enabled ads have lower acceptance of personalized ads, the results indicate that H1 was revoked.

		Levene's Test for Equality of variances		T-Test for Equality of Means		
		Z	Sig.	t	df	Unilateral p
Intrusiviness2	Equal variances assumed	0,446	0,506	-1,942	98	0,028
	Equal variances not assumed			-1,942	97,839	0,028
PrivacyConcerns2	Equal variances assumed	0,28	0,598	-1,193	98	0,118
	Equal variances not assumed			-1,193	97,744	0,118

ConsumerAcceptance2	Equal variances assumed	0,013	0,91	-1,196	98	0,117
	Equal variances not assumed			-1,196	97,184	0,117

Table 8 - T-test Independence Sample Compute Variables

5.2.2.3 Mediation Analysis of Privacy Concerns

The regression analysis using model 4 by Hayes, with 95% confidence interval and 5000 bootstrap samples, allowed studying the direct and indirect effects of the mediator, Privacy Concerns, on the relationship between the independent variable, assistant type (AI vs Human) and the dependent variable, consumer acceptance. The results (Appendix C) demonstrate that the assistant (AI vs Human) didn't have a significant influence the privacy concerns *(B=0.45;Bse=0.37;t=1.19; P =0.24).*

Considering hypothesis 2, in which it was defined that privacy concerns mediates the relationship between AI (vs. Human) on consumer acceptance, consequently consumers will have higher privacy concerns, and consequently, have lower acceptance of AI-enabled ads. Contrary to expectations, the results show that respondents have higher privacy concerns, and consequently, have higher consumer acceptance *(B=0.05, Bse=0.10, t=0.45, p>0.05).* In this sense, privacy concerns do not mediate the relationship between AIvsHuman and consumer acceptance, completely cancelling the main effect *(B=0.02;Bse=0.07, 95% CI =-1242, 0,19).* This way, hypothesis 2 was not supported.

5.2.2.4 Moderated Mediation Model

Then hypotheses were tested with the aid of regression analysis through model 7 of "Process" v4.2, making use of the bootstrapping approach, with 5000 bootstrap samples and 95% confidence intervals. The model was used to study the significance of indirect effects at different levels of the moderator, namely Intrusiveness. To carry out the analysis, consumer acceptance was placed as a dependent variable and privacy concerns as a mediator, to explore the indirect conditional effect of the moderator on the relationship between the independent variable, assistant type (AI vs Human), and the dependent variable, consumer acceptance through the mediator, privacy concerns. In this way, it is possible to study the effect of the moderator on the independent variable and consequently on the mediator.

Hayes regression model 7 allowed to study how intrusiveness moderates the effect of the independent variable through the mediator (Appendix D). However, it is concluded that intrusiveness does not moderate the effect of the assistant (Human vs AI) and Privacy concerns *(B=-.13, Bse=0.22,t=-.61,p=0.54).* However, the model presents an index of moderated mediaton = *-.006 (95% CI = -0.08; 0.06),* which means an insignificant moderating effect of intrusiveness in the assistant type in the indirect effect through the mediator, privacy concerns. However, the indirect effect was higher when respondents considered less intrusiveness *(Effect=0.02, SE=0.1, 95% CI =-.16; 0.25)* and lower when considered more intrusive *(Effect=-.002, SE=0.06, 95% CI =-.12; 0.15).* Finally, the results demonstrate that high levels of intrusiveness raises high privacy concerns *(B=0.65, SE=0.34, t=1.87, p>0.05).*

According to Hypothesis 3, in which Intrusiveness will moderate the influence of AI (vs. Human) enabled ads on privacy concerns, it was possible to validate that intrusiveness does not have a moderating effect on consumer acceptance of ads, revoking the H3.

5.2.2.5 General Linear Univariate Model

The Univariate Regression Model (Table 9) was used to explore the significant effects of the independent variable (Assistant Type: Human vs AI). Firstly, the intrusiveness variable computed through the top three items was placed as the dependent variable, given that previously was not found a main effect of the IV (Independent Variable) on consumer acceptance, using privacy concerns as a covariate and the independent variable as a fixed factor. Thus, it was possible to verify the existence of a marginal effect of the independent variable on intrusiveness (p=0,05). It has been concluded that intrusiveness becomes the new dependent variable.

Origin	Type III sum of squares	df	Average square	Z	Sig.
Corrected Model	12,639	2	6,319	2,216	0,115
Intercept	293,948	1	293,948	103,074	<,001
PrivacyConcerns	0,851	1	0,851	0,298	0,586
FL_48_DO_AI	11,079	1	11,079	3,885	0,052
Standard	276,627	97	2,852		
Total	2408,333	100			
Corrected Total	289,266	99			

Table 9 - General Linear Univariate Model: Marginal Effect

Subsequently, the General Linear Univariate Model was used to analyze in greater detail the Effect of the independent variable on the dependent variable (Intrusiveness), with privacy concerns being excluded as a covariate. The model (Table 10) demonstrated the existence of a main Effect of the independent variable on intrusiveness.

Origin	Type III sum of squares	df	Average square	Z	Sig.
Corrected Model	11,788	1	11,788	4,163	0,044
Intercept	2119,068	1	2119,068	748,415	<,001
FL_48_DO_AI	11,788	1	11,788	4,163	0,044
Standard	277,478	98	2,831		
Total	2408,333	100			
Corrected Total	289,266	99			

Table 10 - General Linear Univariate Model: Main Effect

5.2.2.6 Complementary Study: Influence of AI knowledge on consumer acceptance

To measure influences in the consumers acceptance of personalized advertisements, the complementary study focuses on a specific factor, namely the level of AI knowledge. In SPSS, a new Independence Sample T-Test (Table 11) was conducted to analyze the consumers acceptance according to the level of AI knowledge, considering consumer acceptance as tests variables and knowledge as grouping variable.

The results show a greater acceptance of participants that choose the option active AI development (Mactive= 7.25; SD = 2.25; $t(45)=-2.43$, $p<0.05$). Contrary to expectations, participants with a high knowledge of AI have the lowest acceptance (Mhigh =3.9, SD= 2.25; $t(10)=-1.905$, $p<0.05$), this may be due to the fact that having a lot of knowledge about AI, they know how their personal data can be collected and used and for that reason choose not to accept personalized ads and this fact may explain why participants who never heard of AI have a higher acceptance (Mnever = 4.5; SD=0; $t(44)=0.27$; $p=0.39$, as it is not aware of the risks when accepting the ad has a higher level of agreement but still disagreeing with the presented items.

		Levene's Test for Equality of variances		T-Test for Equality of Means		
		Z	Sig.	t	df	Unilateral p
ConsumerAcceptance 2 (Heard of AI vs Never heard of AI)	Equal variances assumed	.	.	0,27	44	0,394
	Equal variances not assumed			.	.	.
ConsumerAcceptance 2 (Heard of AI vs Active AI Development	Equal variances assumed	0,109	0,743	-2,43	45	0,01
	Equal variances not assumed			-1,835	1,049	0,154
ConsumerAcceptance 2 (High knownledge vs Active AI Development	Equal variances assumed	0,193	0,67	-1,905	10	0,043
	Equal variances not assumed			-1,774	1352	0,137
ConsumerAcceptance 2 (Never heard of AI vs Active AI Development)	Equal variances assumed	.	.	0,907	1	0,265
	Equal variances not assumed			.	.	.
ConsumerAcceptance 2 (Heard of AI vs Knowledge of AI)	Equal variances assumed	0,003	0,955	-0,715	85	0,238
	Equal variances not assumed			-0,715	84,155	0,238

Table 11 – Independence Sample T-Test AI Knowledge

5.2.3 Discussion

The study sought to explore consumers' perception of the use of AI (vs designer assistants) in the development of personalized advertisements during the consumer journey, using six different measurement models to collect relevant insights. As previously mentioned, through the T-test, a significant effect of intrusiveness on consumer acceptance was verified, with no significant impact of Privacy concerns being found.

The results show that AI-enabled ads have higher consumer acceptance than human generated ads. However, still showing a degree of disagreement with the items presented, although less than in the case of the designer assistants' advertisements. A slight difference between AI and human assistants was identified, and it was concluded that advertisements developed by AI are less intrusive and lead to less privacy concerns, contributing to greater consumer acceptance.

The analysis of the mediator through model 4, led to the conclusion that privacy concerns do not mediate the relationship between the assistant and the consumer acceptance, which demonstrates that regardless of privacy concerns, the consumer may or may not accept the personalized ads developed by AI vs human, which demonstrates that the type of assistant has an impact on the acceptance of personalized ads. Additionally, the moderator's analysis indicated that intrusiveness has no significant effect as moderator on the relationship between assistant type (Human vs AI) and consumer acceptance, not moderating the main effect through privacy concerns.

However, through the in-depth analysis of the results, it was possible to identify that there is no significant effect of the moderator and the mediator, and the variables computed through the measurement items are not significant for the study in question, making it not possible to draw great conclusions from the data collected.

This way, through univariate regression it was possible to find a main effect of the independent variable on intrusiveness and a marginal effect of the IV on intrusiveness, with privacy concerns as a covariate. It is concluded that intrusiveness becomes the new dependent variable.

Finally, the analysis of the influence of AI knowledge on consumer acceptance, led to the conclusion that the participants who have greater acceptance are those who actively develop using AI, this could be due to the developing with AI, they know how it works and what are the its benefits and disadvantages, knowing what is behind its operation, being more predisposed to accept them.

6. CONCLUSION

The present study aimed to explore the perception of consumers regarding the use of AI in the development of personalized ads throughout the consumer journey. It has been possible to reach relevant conclusions through the two studies conducted, lab and design experiment.

The research of the visual attention deposited in the ad developed by AI vs human through the pilot study, allowed to verify that the majority of consumers looked at the product in the first place, due to being in the center and being the most striking element of the ad, having subsequently followed by reading from top to bottom. The creation of areas of interest allowed to conclude that ads developed by AI capture the attention of consumers, because when a robot is mentioned in the ad, consumers quickly look at it, but the fact can distract consumers from the main message that the ad wants to send. However, the interest in AI ads may be lower if consumers are not informed of the person responsible for creating them, as in the case of the human generated ad, the fact that it was developed by humans did not capture as much attention from consumers but the title did, this being the main focus in the ad. In this way, companies that used AI to develop their advertisements must put something illusory about the AI or robot in the advertisement itself to arouse interest in consumers.

Conducting a quantitative study, namely an online questionnaire to people aged between 18 and 55 who use the internet to search before making a purchase, to explore the perceptions of intrusiveness, privacy concerns and consequently consumers acceptance when exposed to ads developed by different assistant (AI vs Human), the results showed that, contrary to expectations, the AI ad was considered less intrusive and developed less privacy concerns that the human advertisement, which led to a greater acceptance. The achieved results may be due to the of AI being increasingly talked topic and has been incorporating consumers daily life, arousing people curiosity as they consider that using AI will meet their needs.

Through the in-deph analysis of the Knowledge of AI, it was possible to conclude that people who actively develop AI in their daily lives have greater acceptance of personalized ads. However, those who have high knowledge of AI but don't use the tools, show less acceptance, which demonstrates that the knowledge level of AI influence the consumer acceptance. Therefore, companies that develop advertisements for consumers who already use AI in their lives are more likely to accept the ads.

Regarding the mediator, no effects of privacy concerns were found on consumer acceptance, which demonstrates that concerns about privacy invasion have no influence on consumer acceptance. At the moderator level, no significant effect were find between the Independent variable (Assistant: AI vs Human) and the dependent variable (consumer acceptance),

however was found a main and marginal effect between intrusiveness and consumer acceptance, this way was possible to verify that the intrusiveness felt by consumers influence the acceptance. Considering the analyzed results, the three predefined hypothesis were revoked.

In this way, it is possible to conclude that AI advertisements have a great use for companies, since according to the results presented, this type of ad is capable of capturing the interest of consumers and, therefore companies must adapt their ads to meet consumer's perceptions and be transparent in the message they are passing on and in the use they make of AI to acheive better results.

6.1 THEORETICAL CONTRIBUTIONS

At the theoretical level, this study aims to contribute with insights about the perception of consumers regarding the use of Artificial intelligence in online advertisements along the customer journey (Aguirre et al., 2015), which had not been studied in previous research. Previous studies have focused on studying the perception of consumers from different ages and countries, such as Germany (Krafft et al., 2017), the Philippines (Antonio et al., 2022), Sweden (Gerdman et al., 2017), and Brazil (Rosa, 2021). This study, through the in-depth analysis of prior research regarding the impact of AI on Digital Marketing, in the consumer journey and behavior, and the experimental design and questionnaire, sought to explore the opinion of customers living in Portugal about personalized ads and under what circumstances it changed (Larva, 2021), to fill the existing gap.

Secondly, this study makes a relevant contribution to support existing theories and literature, by providing new conclusions regarding the existing paradox between Personalization and Privacy Concerns (Antonio et al., 2022; Gerdman et al., 2017; Xu et al., 2011; Zhu & Chang, 2016). By studying the influence of concerns about data privacy on consumers perceptions, it highlights the importance of transparency in the collection and use of personal data during the customer journey. The research also contributes to the study of factors that positively and negatively influence consumer perceptions (Larva, 2021; Munyengeterwa, 2021), not just studying knowledge (Chen et al, 2022.; Kumar et al., 2019; Munyengeterwa, 2021), the privacy concern (Krafft et al., 2017), and intrusiveness (Li et al., 2002) separately as done in previous searches.

The study supports future research by academics to further study consumer's perceptions regarding the use of Artificial Intelligence, as it is essential to understand the influence that the use of AI has on consumer behavior.

6.2 MANAGERIAL IMPLICATIONS

About the managerial implications, the results reveal essential insights to the advertisers, marketers, and firms of the portuguese market, that want to implement or have implemented AI, to understand how valuable personalized ads are to the customers along their online journey and to identify the concerns with data privacy as well as the respective influence on the customer's behavior in relation to the companies.

This information may help companies to predict consumer behavior in the presence of personalized advertisements based on their needs and desires and highlight the circumstances that must be consider in the development of marketing communications along consumer's journeys through the use of AI, as several factors in people's daily lives can affect their perception of advertisements, making it necessary for companies, through the information available, to adapt to capture the attention of consumers. One of these factors is the concern with data privacy, through the information collected in this study is possible to understand what kind of measures should be taken at the level of the privacy policy to increase transparency during the data collection and the trust that consumers have in the companies to make communications more effective.

Finally, the results of the study contributed to the advertisers, marketers, and companies, in general, to understand how to adapt personalized online advertisements through Artificial Intelligence to consumer perceptions (Corrêa, 2019), which should be presented at each stage of the customer journey, such as need recognition, information search, evaluation, purchase decision and post-purchase (Mussa, 2020; Rodgers & Nguyen, 2022). Allowing companies to understand what level of personalization of ads should be done and what factors influence the consumer's experience with personalized ads. AI tools make it possible to predict which content is best to present to each customer, thus allowing for a more personalized journey and meeting the needs and privacy rights of consumers, managing to develop strategies that are more targeted to their audience (Figueiredo, 2020).

6.3 LIMITATIONS AND FUTURE RESEARCH

Artificial Intelligence emerged in 1956 (Gomes, 2022), but only recently has it begun to be studied in greater depth. The present Master's thesis aims to fill the existing gap in the impact of AI in the development of personalized ads on the customer journey, having carried out an in-depth literature review and the realization of two studies, Design and Lab experiment. However, the research has limitations that may be overcome in future researches.

In the pilot study, the main limitation was the lack of participants, time and equipment. The use of the Tobii Pro Fusion Eye tracker could only be done within the university's facilities, for a limited time and since the study was conducted by only one person, it made it difficilt to recruit participants. Due to these conditions, the study was carried out by a total of thirty participants, being the most of them students from Nova Ims University. To overcome the perceived limitation, it is suggested to conduct the study with a larger sample and outside the university, with the inclusion of different generations, since people who attend college are more likely to have knowledge regarding the study in question, which may be biased. Second, different approaches such as sentiment analysis or analysis of facial expressions can be used to analyze consumer's opinion regarding the use of AI in personalized ads.

On the designer experiment, one of the main limitations are related to the collection of responses. A total of three hundred twenty-six respondents were surveyed, aged between 18 and 55 years old, who use the internet to research products/services before purchase. However, the vast majority of respondents didn't pass the manipulation check, not being possible to collect the responses necessary for the study to be considered statistically relevant. In future research, a larger sample should be considered, to be able to obtain results that can be generalized and more relevant insights.

The questionnaire present in both studies is based on measurement studies from previous studies to ensure that the questions are relevant and academically validated. However, the fact that the questionnaire presented was in English was also a limitation, in the sense that it was mostly answered by Portuguese citizens, with greater difficulty in understanding what was requested, which may have influenced the answers given. As future research, it is suggested to present the questions in different languages to reach a larger number of respondents.

In both studies, participants were exposed to a generic ad under both conditions (AI vs Human) and were informed that the ad is an example of ad created based on consumer's data. The advertisements were not presented on the real context, encouraging respondents to imagine the scenario in which could appear, which may led to participants didn't feel that their privacy was at risk, which may have influenced the responses given by the participants. To overcome the mentioned limitation, future studies should invest in the creation of personalized ads based on the real data of participants developed by humans or AI, and perform the presentation of the advertising to the participants in search engines or websites, normally used by the respondents, to guarantee a response aligned with the real behavior of the participants, with the aim of collecting results as close to reality as possible.

The study offers greater knowledge regarding the consumers perception of the use of AI in the development of personalized online ads, focusing on intrusiveness, privacy concerns and

consumer acceptance, gathering powerful insights about what consumers are willing to accept in order to have access to personalized ads. However, personalization vs privacy concerns paradox needs to be studied more robustly. Considering the collected insights, the study of other factors capable of influence the consumer acceptance is a good starting point for future studies, such as age, culture, price, social influence, ad design, perceived risk, etc., to contribute to a better understanding of the paradox.

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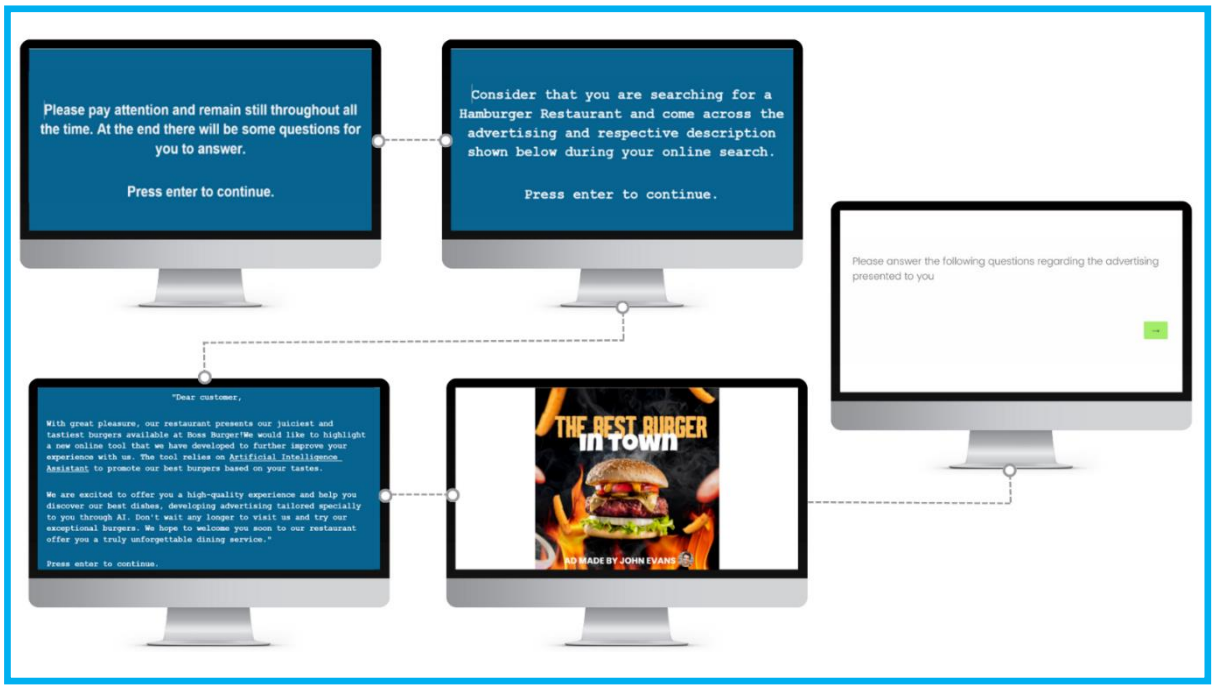
8. APPENDIX

8.1 APPENDIX A: TIMELINES (PILOT STUDY)

Timeline 1. *AI Scenario Tobii Timeline*

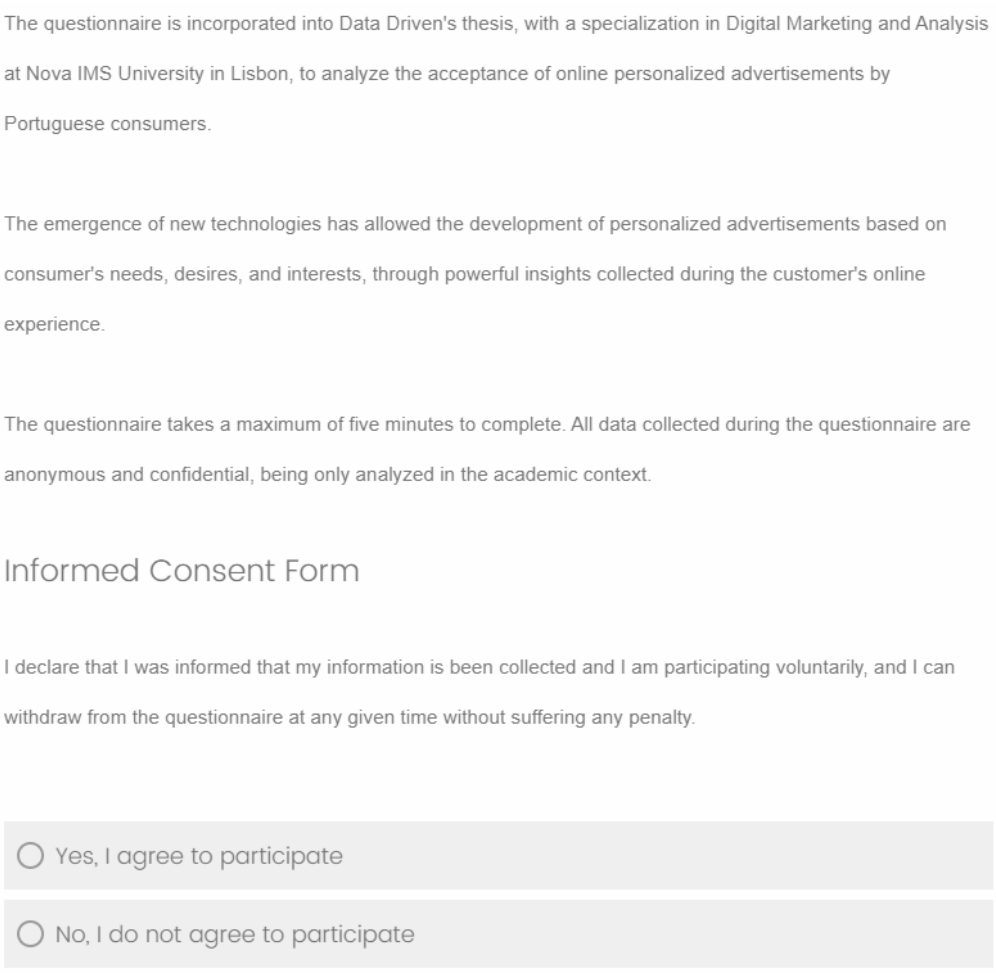
Timeline 2. *Human Scenario Tobii Timeline*



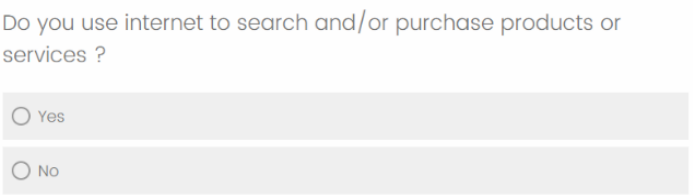
8.2 APPENDIX B: ONLINE QUESTIONNAIRE (STUDY 1)

The images presented below represent the questionnaire completed by the respondents in the study 1 in both scenarios, with the only exception of the Question 4 that is the text that is only presented in the Human assistant scenario and the Question 5 represents the text presented in the AI assistant condition.

Question 1. *Introduction and Informed Consent Form*



Question 2. *Filtering Question*



Question 3. AI Knowledge Level

Which of the following statement better describes your knowledge about Artificial Intelligence (AI) ?

- ○ Never heard of AI
- ○ Heard of AI
- ○ Knowledge of AI
- ○ High knownlegde of AI
- ○ Active AI development

Question 4*. Contextualization and ad presentation (Human Scenario)*

Note: Look carefully at the text and the advertisement presented below

Consider that you are searching for a Hamburger Restaurant and come across the advertising and respective description shown below during your online search:

"Dear customer,

With great pleasure, our restaurant presents our juiciest and tastiest burgers available at Boss Burger!

We would like to highlight our new designer's team working to further improve your experience with us. The Designer Assistants are focused on the promotion of our best burgers, especially to you.

We are excited to offer you a high-quality experience and help you discover our best dishes.

Don't wait any longer to visit us and try our exceptional burgers. We hope to welcome you soon to our restaurant offer you a truly unforgettable dining service."

Question 5. Contextualization and ad presentation (AI Scenario)

Note: Look carefully at the text and the advertisement presented below

Consider that you are searching for a Hamburger Restaurant and come across the advertising and respetive description shown below during your online search:

"Dear customer,

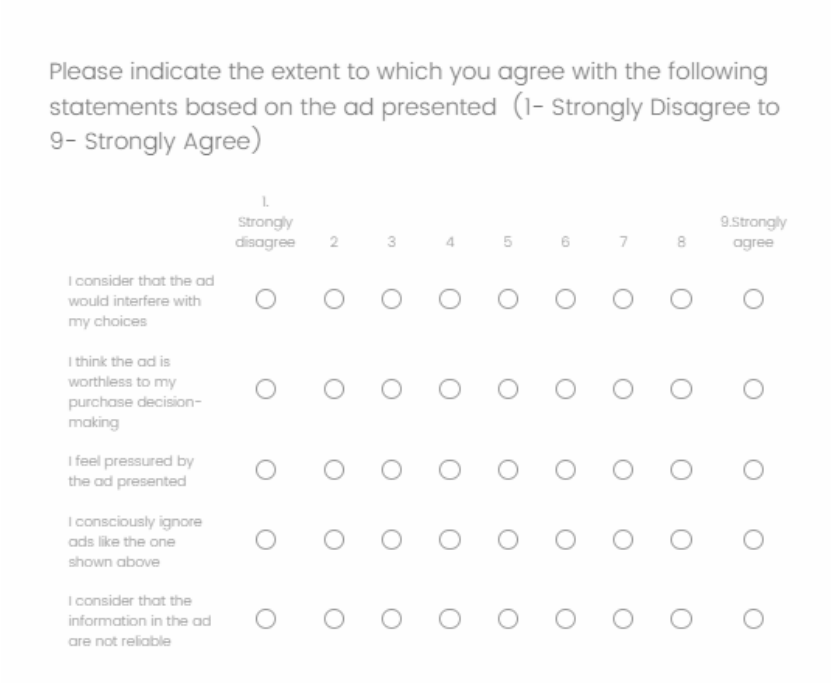
With great pleasure, our restaurant presents our juiciest and tastiest burgers available at Boss Burger!

We would like to highlight a new online tool that we have developed to further improve your experience with us. The tool relies on Artificial Intelligence Assistant to promote our best burgers based on your tastes.

We are excited to offer you a high-quality experience and help you discover our best dishes, developing advertising tailored specially to you through AI.

Don't wait any longer to visit us and try our exceptional burgers. We hope to welcome you soon to our restaurant offer you a trully unforgetable dinning service."

Question 6. *Intrusiveness Perception Construct*



Please indicate the extent to which you agree with the following statements based on the ad presented (1- Strongly Disagree to 9- Strongly Agree)

	1. Strongly disagree	2	3	4	5	6	7	8	9.Strongly agree
I consider that the ad would interfere with my choices	○	○	○	○	○	○	○	○	○
I think the ad is worthless to my purchase decision-making	○	○	○	○	○	○	○	○	○
I feel pressured by the ad presented	○	○	○	○	○	○	○	○	○
I consciously ignore ads like the one shown above	○	○	○	○	○	○	○	○	○
I consider that the information in the ad are not reliable	○	○	○	○	○	○	○	○	○

Question 7. Privacy Concerns Construct

Please indicate the extent to which you agree with the following statements based on the ad presented (1- Strongly Disagree to 9- Strongly Agree)

	1. Strongly disagree	2	3	4	5	6	7	8	9. Strongly Agree
I am concerned about the loss of control of my personal data	○	○	○	○	○	○	○	○	○
I am concerned about the excessive collection of my personal data for the development of ads like the one shown	○	○	○	○	○	○	○	○	○
I consider that the personalized ad showned invaded my privacy	○	○	○	○	○	○	○	○	○
I consider that my personal data can be misused	○	○	○	○	○	○	○	○	○
I am concerned that the companies share my data with third parties	○	○	○	○	○	○	○	○	○

Question 8. *Consumer Acceptance Construct*

Please indicate the extent to which you agree with the following statements based on the ad presented (1- Strongly Disagree to 9- Strongly Agree)

	1. Strongly disagree	2	3	4	5	6	7	8	9. Strongly agree
I feel positively about the ad presented	○	○	○	○	○	○	○	○	○
I am willing to receive ads the one showed in the future	○	○	○	○	○	○	○	○	○
I would see all the online display ads I receive in the future	○	○	○	○	○	○	○	○	○

Question 9. *Manipulation Check Construct*

The ad that you saw was developed by (1-AI Assistant to 9-Designer Assistant):

AI Assistant								Designer Assistant
○	○	○	○	○	○	○	○	○

Question 10. *Demographic Questions*

What is your gender ?

- ○ Male
- ○ Female
- ○ Non-binary / third gender
- ○ Prefer not to say

What is your age ?

What is your educational qualifications ?

- ○ Elementary School
- ○ Middle School
- ○ High School
- ○ Bachelor's Degree
- ○ Masters Degree
- ○ Post-Graduate Degree
- ○ Prefer not to say

8.3 APPENDIX C: MEDIATION ANALYSIS OF PRIVACY CONCERNS (STUDY 1)

Model : 4
Y : Consumer
X : FL_48_DO
M : PrivacyC

Sample
Size: 100

****

OUTCOME VARIABLE:
PrivacyC

Model Summary

R	R-sq	MSE	F	df1	df2	p
,1196	,0143	3,5058	1,4227	1,0000	98,0000	,2358

Model

	coeff	se	t	p	LLCI	ULCI
constant	5,3267	,5921	8,9963	,0000	4,1517	6,5017
FL_48_DO	,4467	,3745	1,1928	,2358	-,2965	1,1898

****

OUTCOME VARIABLE:
Consumer

Model Summary

R	R-sq	MSE	F	df1	df2	p
,1281	,0164	3,7291	,8096	2,0000	97,0000	,4480

Model

	coeff	se	t	p	LLCI	ULCI
constant	4,6215	,8252	5,6008	,0000	2,9838	6,2592
FL_48_DO	-,4808	,3890	-1,2361	,2194	-1,2529	,2912
PrivacyC	,0467	,1042	,4478	,6553	-,1601	,2534

****************** DIRECT AND INDIRECT EFFECTS OF X ON Y ******************

Direct effect of X on Y

Effect	se	t	p	LLCI	ULCI
-,4808	,3890	-1,2361	,2194	-1,2529	,2912

Indirect effect(s) of X on Y:

	Effect	BootSE	BootLLCI	BootULCI
PrivacyC	,0208	,0720	-,1242	,1905

8.4 APPENDIX D: MODERATOR MEDIATION ANALYSIS (STUDY 1)

Model : 7
Y : Consumer
X : FL_48_DO
M : PrivacyC
W : Intrusiv

Sample
Size: 100

****

OUTCOME VARIABLE:
PrivacyC

Model Summary

R	R-sq	MSE	F	df1	df2	p
,4045	,1636	3,0368	6,2594	3,0000	96,0000	,0006

Model

	coeff	se	t	p	LLCI	ULCI
constant	2,7403	1,6396	1,6714	,0979	-,5142	5,9948
FL_48_DO	,7936	1,0887	,7289	,4678	-1,3675	2,9546
Intrusiv	,6452	,3420	1,8868	,0622	-,0336	1,3240
Int_1	-,1334	,2190	-,6091	,5439	-,5680	,3013

Product terms key:
Int_1 : FL_48_DO x Intrusiv

Test(s) of highest order unconditional interaction(s):

	R2-chng	F	df1	df2	p
X*W	,0032	,3710	1,0000	96,0000	,5439

****

OUTCOME VARIABLE:
Consumer

Model Summary

R	R-sq	MSE	F	df1	df2	p
,1281	,0164	3,7291	,8096	2,0000	97,0000	,4480

Model

	coeff	se	t	p	LLCI	ULCI
constant	4,6215	,8252	5,6008	,0000	2,9838	6,2592
FL_48_DO	-,4808	,3890	-1,2361	,2194	-1,2529	,2912
PrivacyC	,0467	,1042	,4478	,6553	-,1601	,2534

********** DIRECT AND INDIRECT EFFECTS OF X ON Y **********

Direct effect of X on Y

Effect	se	t	p	LLCI	ULCI
-,4808	,3890	-1,2361	,2194	-1,2529	,2912

Conditional indirect effects of X on Y:

INDIRECT EFFECT:

FL_48_DO -> PrivacyC -> Consumer

Intrusiv	Effect	BootSE	BootLLCI	BootULCI
2,7500	,0199	,0956	-,1605	,2507
4,7500	,0075	,0531	-,0868	,1418
6,2500	-,0019	,0600	-,1159	,1485

Index of moderated mediation:

	Index	BootSE	BootLLCI	BootULCI
Intrusiv	-,0062	,0324	-,0810	,0619